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The examination of manpower planning is an important management activity rather than as a specialist technique is the purpose of this pamphlet. "The Climate of Manpower Planning" describes the present circumstances in which manpower studies are carried out and the national economic and political forces which affect organizations. "Motivation for Manpower Studies," "Manpower Analysis," and "Manpower Utilization: The First Priority" discuss company involvement in such planning and basic information gathering systems, and emphasize the need for studies of manpower utilization. "Manpower Forecasting" and "Manpower Planning in the Organization" distinguish between manpower forecasting and manpower planning, and indicate how a forecast is turned into a plan. "Manpower and Government" discusses the role of government in national manpower investigations. "Manpower and Training" shows how national training needs and requirements can be closely linked to a manpower plan. "Manpower and Education" discusses the implications of present trends in the educational system for the future availability of manpower. (EM)

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Perspectives in Manpower Planning

An Edinburgh Group Report

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INSTITUTE OF PERSONNEL MANAGEMENT

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Perspectives in Manpower Planning

An Edinburgh Group Report

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The Edinburgh Group

The Edinburgh Group was first established after the Edinburgh Conference of the IPM in 1961 and has some 80 members, most of whom are members of the Institute, with ages ranging in general up to 35. The Group meets regularly to hear visiting speakers although the main activity is centred in smaller study groups on particular topics.

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The Authors

Gareth Jones (Convenor) is 34. He was convenor of the study group on manpower planning and Chairman of the Edinburgh Group in 1965. He read science at Cambridge and psychology at London University. He has worked on manpower problems in an oil company and is now in their marketing department.

David Bell He joined the personnel department of the Central Electricity Generating Board after reading Greats at Oxford. Initially, he was in the education and training branch: now he deals with manpower statistics, forecasting and control. He is 31.

Alexander Center is a graduate of Aberdeen. After some years in the oil and advertising industries, he is now a personnel officer in a large private company in the construction industry. He is 30 and is the present Chairman of the Edinburgh Group.

David Coleman who is 27, obtained the personnel management diploma at the London School of Economics, having graduated from Reading in psychology and economics, and after working for a year as a machine operator. He joined the CEGB in 1963 and works on training methods in the education and training branch.

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PERSPECTIVES IN MANPOWER PLANNING

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Foreword

There can be few people in Britain today who are unfamiliar with the term 'manpower planning'. The difficulty is that there appears to be no general agreement on what this means in practice. The phrase appears in the context of discussions on unemployment, on productivity, on apprenticeship training and on the expansion of higher education, to name but a few. This pamphlet gives one interpretation and brings together much that has been written and spoken in this field.

The first chapter describes the present environment in which manpower studies are carried out and the national economic and political forces which affect the organization.

The following three chapters discuss why companies should be involved in this field at all and the basic information system that is needed for manpower studies, and to emphasize the need for studies of manpower utilization as a cornerstone of all future work.

Chapters five and six bring out important distinctions between manpower forecasting and manpower planning in the organization, and indicate how, and under what conditions, a forecast is turned into a plan.

The last three chapters are concerned with wider issues which affect the individual company. Chapter seven discusses the role of government in national manpower investigations and the following chapter is concerned to show how national training needs and requirements can be more closely linked in to a manpower plan. Finally, chapter nine discusses the implications of present-day trends in the educational system for the future availability of manpower.

This pamphlet is concerned to emphasize that manpower planning is not just a specialist technique but is a management activity of the highest importance.

Summary and recommendations

The climate

The manpower adviser operates in a climate of uncertainty. His task is to interpret movements in national policies (SET; REP) in terms of the implications for his own organization. (Ch 1)

Motivations for manpower studies

There are at least two good reasons why all organizations should objectively study their manpower resources: expected problems in recruiting personnel with special skills; changes within the organization arising from a search for increased efficiency and greater productivity. (Ch 2)

Manpower studies

All manpower studies need to be preceded by a carefully planned information system on personnel, based on useful classification systems so constructed to permit rapid analysis of problems. (Ch 3)

All organizations should have a manpower group whose responsibility it is to look objectively at the way in which the organization deploys its manpower at all levels. *This is a separate function* which complements the recruitment, training and industrial relations responsibilities of the personnel department. (Ch 3)

Manpower utilization

These studies are a priority for any organization for one vital reason; unless present patterns of manpower utilization are understood, all projections of future needs and supply are based on illusion.

The results of studies of manpower utilization are incapable of interpretation without stringent assessments of the job-objectives being available. (Ch 4)

Manpower forecasting

Demand No forecast of future manpower demand is more accurate than the forecast of the organization's objectives, defined in reasonably specific economic terms. These policy matters need to be known to the head of the manpower group.

Supply Two aspects need to be studied: internal projections from the existing employees, based on careful study of personnel characteristics; secondly, estimates have to be available from the labour market, on the likely availability of certain occupational groups. (Ch 5)

Manpower planning

All planning implies a knowledge of objectives; it likewise implies action. Hence recruitment, training/retraining and redeployment programmes all form part of the manpower plans of the organization.

Feedback is essential at all times; nothing is more likely to need constant revision than the assumptions underlying a manpower plan. (Ch 6)

Manpower and government

There are a growing number of institutions involved in manpower studies and several government departments are concerned in this field. The time has come for a purposeful, consolidated effort to be made on these problems, which would itself increase the effective use of manpower.

A National Manpower Commission (NMC) should be established. This would be a statutory body with a director and staff who would not be civil servants. It would be responsible to the Department of Economic Affairs under the present government structure.

This would take on the statutory responsibility for the following tasks:

(a) making forecasts of demand for manpower at all levels of skill throughout the economy and forecast studies of supply, carrying out detailed studies of manpower utilization;

(b) producing an Annual Manpower Report which would be laid before Parliament;

(c) providing the necessary manpower data needed by the Industrial Training Boards.

The Manpower Research Unit should assume the responsibilities for forecasting and planning the manpower needs of the Government and public services as an employer. It would thus fulfil the responsibilities of a manpower group within a company. (Ch 7)

Manpower and training

The levy/grant system, operative under the terms of the 1964 Industrial Training Act, is in danger of permitting insufficient training to be done within an industry.

All ITBs should develop methods of quantifying the total training needs of the industry. To be able to achieve this, ITBs should devote far greater resources than they have done to date to the admittedly difficult task of forecasting the demand for different types of skill within the industry five to ten years ahead.

All training boards should be particularly concerned to evaluate the need for retraining; in this country we should be considering the general need to retrain 250,000 people *a year* in the 1970s. (Ch 8)

Manpower and education

Education in this country is 'too pure by half'.

There must be greater contact between educational institutions and industry: industry must take more spontaneous action than it has done in the past, but the schools and universities should show greater interest in commercial and business activity. Some specific means by which one group could gain a better appreciation of the other are suggested. (Ch 9)

Chapter 1—The climate of manpower planning

All organizations operate within determinate limits: a company must give a reasonable return on its investment, a public service (the hospital service or the universities) has the responsibility of providing the optimum service within the resources at its disposal. But besides this, we all work within the national limitations: it is Britain's balance of payments situation that not only causes any government to impose particular restrictions on companies, but which also affects the availability of finance to extend the social services.

Those concerned with the range of manpower issues are affected, often more significantly than they may realize, by the actions of governments as they wrestle with Britain's economic problems. For this reason, it is worth setting out briefly the ways in which the thinking and the options open to them are affected by decisions taken in Whitehall.

Productivity

We have heard frequently over the past few years that our output has increased more slowly than that of other countries.

Annual increase in output 1955–64 (%)

Japan	8·8	France	4·7	UK	2·6
Italy	5·7	Western Germany	4·4	USA	1·9
Russia	5·0				

As the working population of this country has been roughly constant over the period (and will, incidentally, show no increase until the 1970s) there must have been some improvement in manpower productivity. But it has not been greater for a variety of reasons.

Probably the first of these is that people have been wastefully employed, partly as a result of union/employer agreements and partly as a consequence of tradition and management inertia. The employment of guards on ballast trains by British Rail, although they do nothing for the period the ballast is being unloaded,[1] is a ready example.

Secondly, many employers have had insufficient economic incentive to install more machinery because labour costs in this country are amongst the lowest in Western Europe.[2] If instead we had high wage rates, employers would find they had greater incentives to install labour saving machinery.

A third factor affects cost and dilutes the benefit to an employer of increased productivity arising from productivity agreements. It has been found that, as a result of the principle of comparability, if an increase in wages has resulted from a genuine productivity agreement with blue collar workers, white collar workers may well seek higher wages to maintain historical wage differentials. If these are granted without corresponding productivity increases (and these may well be difficult to find), the resulting total situation could be of no significant benefit to the employer in terms of cost-reduction.

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[1] PIB Report Number 8, Cmnd 2873, January 1966

[2] EFTA Study, 1967

The pressure from employees for wage increases and the pressure by Government on organizations to resist cost increases is going to provide a most salutary push in the direction of productivity bargaining. This is also an area for those concerned with manpower problems: their appreciation of the pressures on the organization will assist in policy formulation; their objectivity will help to ensure that their companies get a reasonable deal from the bargains when struck and, later, when they have been implemented.

Employment

It has been argued that the most significant factor causing wage pressure over the past ten years has been over-full employment. Professor Paish's doctrine[3] is that whenever we have tried to run the economy with an insufficient margin of unused resources, we have been unable to control incomes; this has caused costs to rise, export prices to increase and balance of payments problems to occur.

Paish's view is that the minimum amount of unemployment which would be practicable is 2¼ per cent: indeed, Sweden regards full employment as being between 97 and 98 per cent of the total. Over the past ten years the percentage unemployed in this country generally has ranged between 1·2 per cent and 2·1 per cent and, of the total number unemployed, perhaps 0·6 per cent represents the chronically unemployable. It is only in 1967 that the numbers unemployed have risen to around 600,000, i.e. 2¾ per cent.

The present Government has only comparatively recently by implication accepted Paish's thesis, and the public outcry against an unemployment rate of 2 per cent is less likely to be so vehement in the future. Even today, when the overall number seeking jobs exceeds the total number of jobs available, certain jobs calling for *skilled* people are remaining unfilled. However, when the overall employment level is 97–98 per cent, it will certainly be down to 90 per cent in particular localities, especially where there is an absence of expanding, or labour intensive, industries as in parts of Wales, Scotland, Northern Ireland and the North East. There are political and economic reasons for reducing pockets of relatively high unemployment and the Regional Employment Premiums have been introduced in an attempt to deal with the problem. These aim at halving the present employment disparities between the development areas and the country as a whole over a period of years.

The National Plan

The 1965 National Plan is a good example of 1965 thinking on manpower questions, and of the assumptions that continue to underlie much action.

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[3] The Limits of Incomes Policy. Institute of Economic Affairs. See also Harold Wincott's 2½% or Spitting in the Foreman's Eye, *Financial Times*, 18 January 1966

Produced at top speed for political reasons, it never was a plan at all but a forecast of how the country would appear in 1970, if a certain set of assumptions held good.

On the manpower side, it highlighted the fact that certain skills were scarce. But the nature of the demands made on firms by the Department of Economic Affairs, in the course of its industrial studies, and the pressure on them to provide some kind of answer in a matter of weeks, encouraged little, if any, basic investigation of any organization's manpower requirements in 1970. As a consequence the National Plan reported:

> "Since the productivity increase forecast by the industrial enquiry is not yet quite enough to achieve 25 per cent national growth, there is an apparent 'manpower gap' with the demand for extra labour of 800,000 exceeding the 400,000 likely to become available without changes in policies. The resulting gap of 400,000 could be reduced to 200,000 by successful regional policies. No great significance can be attached to this precise figure, given the difficulties of forecasting supply and demand for labour five years ahead; and it is not large in relation to a total labour force of over 25 million. But it is substantial in relation to the *growth* of the labour force".

Thus the assertion that Britain is short of manpower has been reinforced, although the figures could quite easily have come out the other way and shown a surplus of 200,000! The 'gap' is, as the Plan itself admits, under one per cent of the total labour force and firms with practical experience in forecasting their future needs would consider themselves doing very well if they forecast to within five per cent, two years ahead! During the past two years we have witnessed, partly in consequence, a number of Government pronouncements on manpower issues based on the assumption that Britain is short of manpower.

Selective Employment Tax

The April 1966 budget saw the introduction of SET. By giving a net payment of 7s 6d a week for each man employed in manufacturing industry (3s 9d a week for women and boys, 2s 6d for girls) it assumed that manufacturing industry was short of labour. By taxing service industries (wholesale, retailing) it was supposed to discourage the employment of television make-up girls, shop-girls and barbers and divert them to where they were needed in manufacturing industry. Yet the more advanced a society becomes, the greater its demand for services (education, health, housing, retailing): in the United States 60 per cent of the working population are employed in service industries compared with 50 per cent in this country. Furthermore, retailers were permitted to pass this tax on to the customers, so removing any incentive for reducing staff. The tax is, however, likely to succeed in its primary objective of raising £300 million for the Treasury a year.

The inconsistencies of SET permit the companies which build factories to bear the tax, while those who manufacture within do not; growers of tomatoes pay the tax while those who manufacture ketchup do not; those who deliver their own manufactured products do not pay SET but those who deliver other people's do. The definition of what was, or was not, a manufacturing establishment took months to disentangle. The tax in 1966 discouraged the employment of the disabled and part-timers working more than eight but less than 21 hours a week. For both these groups there are good economic, as well as social, reasons for encouraging employment. The 1967 Finance Bill recognized one of these anomalies and SET rates for part-timers were halved.

The basic objection to SET is that it does not encourage the best use of limited manpower resources.

The July 1966 squeeze

A further demonstration that the paths of company manpower forecasting are not easily trodden came when the unpredicted prices and incomes standstill was invoked in July 1966. The planned rate of growth expected less than a year earlier could no longer be considered as realistic. The standstill had particular manpower implications. The Prime Minister said:

> ". . . what is needed is a shake-out which will release the nation's manpower, skilled and unskilled and lead to a more purposive use of labour for the sake of increasing exports . . . This redeployment can be achieved only by cuts in the present inflated level of demand . . .".

A penetrating analysis of this concept by G L Reid,[4] Department of Social and Economic Research, Glasgow University, argued that this is precisely what would *not* happen as a result of the squeeze. He believed that, in practice, employers are more likely than not to lay off (at such times) those employees who are readily replaceable in more profitable times—these are not the highly skilled.

Retraining, a necessary adjunct of redeployment, is lengthy and not enough facilities exist. In any case, deflation first hits industries which have a strong underlying growth trend (eg motor manufacture) and which are also good exporters: these companies are likely therefore to want fewer people in a recession. The freezing of the wage structure means that it would be impossible to attract people into different trades by attractive wages. In the event he was proved right. Reid argued that in reality redeployment is more effectively brought about when the work environment is not frozen and when a high and steady state of employment is being maintained.

As a further justification of this action, the Prime Minister asserted that it would benefit those firms who were failing to get export orders through labour shortages: this was denied by some large exporting companies. Generally, securing export orders is dependent on factors other than marginal increases in the total labour force at the factories, although this statement is conceivably true for some small specialized firms. It would be equally valuable from the national viewpoint to encourage more manpower to enter those industries which are unable to meet domestic demand at present, so helping to reduce the quantity of imported goods.

[4] *The Times*, 2 September 1966

The Regional Employment Premium

Ironically, the availability of tax allowances on investment (now cash grants) in development areas resulted in the growth of capital intensive industry (oil and chemicals particularly) which are not large scale employers of labour. In an attempt to redress this situation, the Government has introduced the Regional Employment Premium.[5]

A payment of around 30s a week per man will be paid to manufacturing industries established or to be established within the development areas: this will be effective for the next seven years.

The White Paper recorded several criticisms on the REP proposal. The most fundamental from the manpower viewpoint is the perpetration of the artificial distinction between 'productive' manufacturing industry and 'non-productive' service industries: yet the balance of payments is materially helped by the tourist industry in the development areas. Would it not make good sense to allow the hotel and catering industries in these areas to be exempt from SET and receive the Regional Employment Premium?

Legislation

In recent years, governments have intervened directly on manpower issues In 1964, the Industrial Training Act was passed. The Redundancy Payments Act was introduced in 1965, by which employees receive a statutory (minimum) wage-related compensation for loss of a job through no fault of their own, based on their age and service. Laws governing conditions of employment are also already in existence; legislation affecting labour availability will make its impact when the school leaving age is raised to 16; part-time education compulsorily to 18 could be effective in the 1970s. Wage-related unemployment benefits or redeployment payment requirements could be part of the national scene by the early 1970s.

The search for an incomes policy gives rise to legislation which affects incomes, industrial relations and prices and affects in consequence the manpower practices of an organization. The original argument for an incomes policy runs that, in full employment, the combination of very large companies and powerful trades unions generates a cost-push inflation in which the unions push up the costs and the employers put up their prices to cover these increased costs. Attempts to combat this inflation by dampening down demand causes the politically unacceptable increase in unemployment seen in recent months.

In December 1964, the Declaration of Intent was signed by the Trades Union Congress and employers' organizations and, in order to put its good aspirations into effect, the Prices and Incomes Board was mooted in a White Paper of the following February. Quasi-judicial in its original conception, the Chairman, Aubrey Jones, has directed it into an opinion forming organization to encourage wider, more informed discussion on the use of manpower and what increasing productivity can mean in real situations. The reports of the PIB should be compulsory reading for those concerned with manpower problems in the firm.

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[5] *The Development Areas: Regional Employment Premium*, Cmnd 3310, June 1967

Implications of policy

When not directly influencing manpower by legislation, governments directly influence an organization's manpower requirements by purchases and contracts. The impact of such action on meaningful manpower forecasting can best be illustrated by defence spending.

In the last ten years, our defence policies have focused primarily on the nuclear strike force—hence investment in V-bombers. The concept of defence for the 1970s is changing; the type of war in which Britain has more recently been engaged calls for aircraft different from those requiring long runways to deliver nuclear devices. The concept of our defence role East of Suez (if there is to be one) affects not only expenditure and the balance of payments but the manufacturers themselves. The cancellation of the TSR-2 affected employment at the BAC factories at Weybridge and Preston and decanted workers of differing skills on to the labour market. According to John Horam,[6] the machinists and draughtsmen, being scarce, were reasonably quickly absorbed; the semi-skilled and unskilled took longer but there were regional variations between Weybridge and Preston. The decision to buy F111 bombers from the Americans instead of relying on British aircraft carriers has clear if not yet fully evaluated consequences for the Navy, the shipbuilders and the aircraft industry.

The national fuel policy will reflect the energy balance of coal, oil and natural gas as primary fuels. Cutting back the National Plan forecast for coal by, say, 20 per cent because of the North Sea natural gas discovery would make a tremendous difference to the manpower requirements of the coal industry, and affect in turn the pattern of regional employment. An expansion of the gas industry will create a demand for management and skilled and semi-skilled craftsmen which could not have been foreseen two years ago. As recently as September 1965, the National Plan commented: "In the longer term, the possibility of natural gas or oil being discovered under the North Sea may bring further benefit to the economy"!

Complex legislation creates additional demands for specialists within companies. It has been suggested that, following the introduction of the Capital Gains and Corporation Tax, the income of accountants and tax specialists rose 20 per cent. The manpower problems and costs of such activity on the community are rarely studied, but Professor Tony Merrett has estimated[7] that the introduction of the Corporation and Capital Gains Tax may well have cost £30 million in accountants' time. Complex legislation also creates strains within government departments themselves and it is frequently difficult to recruit high calibre specialists into the Civil Service to implement and study the legislation required.

[6] *Financial Times,* 17 May 1965
[7] *Sunday Times,* 25 September 1966

The recent legislation designed to deter motorists who have been drinking from driving would not appear to have been associated with a large scale campaign to recruit and train the laboratory technicians necessary to perform blood tests *and* to go into court to give evidence on their analysis.[8]

Future change

Britain's entry to the European Economic Community is one possible development which would have interesting manpower ramifications. Intercountry mobility of labour could well increase significantly. The national balance of skilled/semi-skilled/unskilled could be affected; there would be reaction from employee groups who felt their jobs were being threatened by immigrant labour; and the opportunities for those with transferable professional skills would be greatly increased.

At present we express concern about the brain-drain to the USA and the Commonwealth. A fresh challenge to Britain could arise by migration from this country to Paris, the Rhineland or Brussels. British management bears higher marginal rates of tax than its counterparts in other European countries. Annual surveys by Associated Industrial Consultants Ltd reveal that the best paying country in general is France, followed by Belgium and Germany, and the annual rate of increase of salary of British businessmen has been one of the lowest in Western Europe over the past five years.[9] Harry Roff, Management Selection Ltd, was reported as saying[10] that in France, compared with the UK, an equivalent managerial job will carry between 25 and 40 per cent higher salary—and in France less tax is payable.

Government economics and manpower

The key to government action at this time is a concern for the balance of payments and economic action will be taken to increase our exports and cut down on imports. Incentives will be offered to organizations broadly consistent with this end in view but, as has been noted, manpower questions do not lend themselves to over-simple incentive schemes.

The political philosophy of a government will also affect the nation's manpower. How much can be controlled centrally, or should be if it can, is a question for politicians; yet the implications for companies attempting to recruit is considerable. The finance available for the social services and the priorities given, the balance between public and private building, fuel policy and defence expenditure all call for decisions which depend on the persuasion of the politicians in command.

Manpower at the company level is thus affected by economic circumstances and political decision taking. The successsful manpower plan for an organization will have taken these economic and political pressures into account.

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[8] *Evening Standard*, 19 September 1967
[9] Reported in *New Society*, 27 May 1965
[10] *Evening Standard*, 31 March 1967

Chapter 2—Motivation for manpower studies

The lessons of recent years for industrial organizations have been several but the most severe is that profits are becoming harder to earn. Increasing competitive pressures on prices and rising costs are forcing managements to make economies and streamline their organizations.

Running parallel with this drive for increased efficiency are shortages of manpower. In particular, whether the prediction of a 'manpower gap' was right or wrong, the National Plan suggested there probably would be an intensification of the difficulties which were already being experienced with certain categories of manpower by some firms.

This has brought into clear focus manpower issues and the importance of manpower utilization. Improved utilization is not merely a matter of long-term thinking, but is also now the concern of companies. Computers in offices, automation in factories and productivity bargaining at the negotiating table can all contribute. Operational research, organization and methods study, financial analysis, market research and other staff functions are all ultimately concerned with making more effective use of human and capital resources.

Human resources

It is gradually becoming accepted that manpower is a resource like capital and materials; but the effective deployment of human resources is as difficult to master as the effective deployment of physical and financial resources. All can give valuable returns in terms of a company's or a nation's well-being; but all can be squandered on trivial activities. Yet the resource of manpower has been largely neglected: most companies think hard before investing £200,000 in equipment, but give scant consideration to the commitment to a similar sum in the 30 year career of one of their executives. Yet by ensuring that employees are at all times contributing to the firm's future viability not only is the best use made of the resource by the firm but individuals can receive the maximum amount of job satisfaction for themselves.

An article in the *BP Shield*[1] developed this theme.

> "The future of any company will be mainly conditioned by the quality and quantity of its human and physical resources and the creative input of science and technology. But it is not enough to have the resources and the creative input alone. They must be utilized to the full by employing the most sophisticated techniques of organization and management that are available. Too often the physical resources are subject to the most careful scrutiny and evaluation while the human resources receive little more than a passing thought".

[1] April 1966

Such objective thinking on human beings is bound to cause suspicion amongst certain employees. It is therefore important that all employees understand, and emotionally accept, the reason for an organization taking this viewpoint. It is significant that this article, which appeared in a company's house journal, ended with the reminder that such studies should contribute to the future well-being both of the company and its employees.

An article in *Business*[2] in 1965 reviewed the work which then had been done in formal manpower studies in three companies, Esso, Fords and Standard Telephones and Cables. In all these companies manpower problems were receiving critical attention because of the need to ensure the company had a well-balanced internal supply of labour, the need to minimize dislocations to production schedules through having the right people in the right location at the right time, or the need to reduce costs through more effective deployment of resources.

Since then work on manpower problems has increased substantially for various reasons. All reasons stem, however, from the fact that manpower is one of the resources which management needs to control. The more immediate reasons for the work fall into two categories:

(a) The need to ensure that future labour requirements will be available.

(b) The need for greater productivity within the organization, which involves studies of manpower.

Within this framework fall all the reasons for manpower planning. It is surprising that the need has not been felt earlier. For example, a method of supplying manpower needs is training schemes and the number to be trained is an elementary consideration in planning the schemes. Manpower planning is needed for this to be a rational decision and, as P R Hodgson[3] has said, "it is surprising that the necessities of training had not mothered its invention earlier".

Other benefits can result from efficient manpower planning. Planning is an essential prerequisite of productivity bargaining, if the firm is fully to understand what it aims to achieve and what value to attach to it. But unless the employees are confident that the employer's predictions are soundly based, they are unlikely readily to accept proposals which affect employment. The build-up of trust may be a long term benefit of successful manpower planning. Meanwhile, as a shorter term aim, continuity of employment, to the benefit of firm and employees, can best be assured by manpower planning.

Problems of supply

The National Plan and the NEDC pamphlet *Conditions Favourable to Faster Growth*[4] have called attention to the shortage that is occurring nationally for professional and craft skills and to the regional imbalances in the labour force. Some of the most acute social and political activities of the next five years or so lie in reviving the development areas, providing for the growing demand for scientists and engineers and meeting the challenge of computers and automation.

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[2] Three Firms Face up to Manpower Planning, *Business*, April 1965

[3] Manpower Planning—At the Level of the Firm, *BACIE Journal*, December 1965

[4] HMSO, 1963

Development areas

The availability of labour is an important consideration for a company deciding to move to a development area. There are financial advantages in the form of government grants and land may be cheaper, but labour of the right kind could be short. There are specific restrictions on the expansion of factories in the South East, as well as positive inducements to go to the Mersey, Tees or Clydeside.

A company is faced with the problem that the available labour may need extensive retraining and it is the older worker, rather than the younger, who is available. Ministry of Labour training grants recognize this need. The skills are probably not immediately transferable and some retraining will be needed for the craftsman to change over from his former heavy engineering to the new light engineering.

In any case, the out-of-work will tend to be the semi-skilled and the unskilled (about half are labourers). It is therefore understandable that the new industries in the development areas have tended to be capital-intensive and to employ relatively few workers, especially since the main government assistance has been investment allowances and grants.

The basic problem for the manpower analyst is to ascertain the labour supply situation in an area in advance. He is not greatly helped by nationally available statistics, although the local Ministry of Labour office can be useful. We need in fact an extension of the monumental, exhaustive work done by Mansel Hodges at the College of Technology at Cardiff to have full information on the manpower resources of a region. In Wales, many types of manufacturing industry are absent, for example, and according to Glyn Davies' analysis of regional employment,[5] some 50 of the standard industrial categories are poorly represented. A further critically important point is not to be misled by *percentages* of unemployed: it is the size of the local labour force that is important. In April 1967 there were 2,200 available for work in Jarrow, Merthyr Tydfil, Cleator Moor and Clydebank: in Brixton, Croydon, Edgware Road and Hackney Exchange areas there were 5,100.

Scientists and technologists

The Committee on Manpower Resources for Science and Technology has carried out studies over the years into the future supply of technically qualified men and women.[6] Organizations requiring technical skills in the sciences and engineering—not to mention mathematics and finance—have every incentive to look in detail at their real requirements. The future supply is by no means assured and, if the future need of a company is for a technologist: technician ratio of 1:4 rather than the current practice of a ratio of 1:2, this could simplify the recruitment of technologists. The real problem could be the recruitment and training of technical supporting staff. The Committee distinguishes between demand and need, the demand being what the firms state as their requirements and the need being the numbers nationally desirable. However, it implies that need exceeds demand, whereas with improved utilization the reverse could be true. The demands made by the nuclear energy industry in the USA, which were never met, did not prevent growth which outpaced all predictions and James W. Kuhn[7] suggests that need was, in fact, less than demand.

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[5] *Oxford Economic Papers*, 1967

[6] See *A Review of the Scope and Problems of Scientific and Technological Manpower Policy*, HMSO, Cmnd 2800, October 1965, and the triennial report of the committee

The problems of supply in this category are not only in the numbers of young people receiving training but, in the case of the highly qualified, from industry's viewpoint, the drift to university and government careers, indicating a reluctance to take up an industrial career. This general difficulty is discussed in the final chapter.

Computers in offices

Only ten computers were installed in this country in 1956; at the end of 1961 there were 300; at the end of 1964 around 600 and, by 1974, it has been estimated that there could be over 5,000.[8] These later machines will, of course, be sophisticated computers with a tremendous capacity for number-crunching and for carrying out complex analytical tasks. Real-time computing will be commonplace and the exchange of information between man and machine will take place continuously.

Brian Murphy of ICT has calculated[9] that the national requirement for personnel associated with computers will rise to 100,000 by the mid-seventies: around 25,000 systems analysts and 40,000 programmers could well be needed. At present, there are probably around 6,000 systems analysts and 10,000 programmers in the country.

The manpower problems of a firm will not end with the selection and training of programmers and analysts. The establishment of new information flow systems in the organization will enable senior management to be presented with control information on all the divisions of a company directly by the computer, instead of receiving collated data on sales or production filtered up through the company. This brings about a major change in management activities and responsibility. The personal stress induced in older employees by the computer, with its associated young programmers and analysts, can be considerable. Pressure on salary structures are considerable since top rate systems analysts can be earning £3,000 a year at 30. The problems of career planning for computer specialists in user and manufacturing companies have normally not yet been resolved. In the next ten years, computers will have taken over 300,000 office jobs according to the forecasts of the Manpower Research Unit.[10] But the problem is probably not redundancy or redeployment of office staff, since many are women with no firm attachment to an office career. It is the supply of specialists which needs attention.

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[7] *Scientific and Managerial Manpower in the Nuclear Industry*, by James W Kuhn, Columbia University Press, 1966

[8] *Computers in Britain*, a Bow Group pamphlet, 1967

[9] *New Scientist*, 10 June 1965

Automation in factories

Automation of repetitive processes in the factory will also bring about a change in the demand for semi-skilled and unskilled workers. On the other hand, there will presumably be an increased demand for skilled men to design, manufacture and service the machines themselves. There could be many unemployed, not only the unskilled, but also those with obsolete skills.

The replacement of human activity by a machine is not new: indeed the world's first continuous, automatic flour mill was built in Philadelphia in 1783. But the rate of automation of processes, both to increase *quantity* of output and to increase *quality*, is increasing and, with the arrival of computers, the rate will doubtless be speeded up.

The coming of automation is frequently viewed with suspicion, as a threat to job security. Certainly automation brings change and there will need to be an acceptance of the inevitability of change, but there is no reason to suppose that it need cause widespread redundancies, provided that all companies examine critically their plans for the future, take good care to prepare personnel for the changes that lie ahead and plan for these events.[11]

"Automation need not be feared", reported President Johnson's Commission on Automation, "provided that the central Government pursues 'aggressive' economic measures to stimulate overall growth and imaginative social policies."[12] Nevertheless, it did advocate that there were certain steps which should be taken by the central Government to alleviate the problems caused.

We need to find out much more about these problems and how they would affect our labour situation: this should be a high priority for industrial studies in British industry. A study of automation in a steel plant when a continuous strip mill was introduced showed that there was a net increase in the demand for craftsmen (from 14 per cent of the labour force) mainly due to a need for extra skilled maintenance workers.[13] A report prepared for the Swedish Academy of Engineering Sciences in 1960 noted[14] that in some cases 'job enlargement' is in effect taking place as the automated machinery makes greater demands on the workers previously doing a skilled job, but that automatic devices can replace some skilled workers, by creating jobs which will require little training and traditional know-how. It is clear that a drastic reform of retraining facilities is going to be needed to make possible a fully satisfactory matching of employee and job.

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[10] Manpower Studies No 4, *Computers in Offices*, HMSO, 1965
[11] *Automation*, July 1966
[12] *The Times*, 4 February 1966
[13] *Automation*, Department of Scientific and Industrial Research, 1956
[14] Quoted by Stephen Aris in *Penguin Survey of Business & Industry, 1965*

Data handling and problem solving

The detailed manpower implications of computers and automated machinery in handling data at top speed and solving problems cannot be foreseen. The general rule would be that detailed manpower needs can only be anticipated as far ahead as the detailed technology can be foreseen. If one does not know exactly what the computers and automated production lines of 1970 are going to be capable of then, clearly the manning cannot be exactly forecast either. For example, character-recognition techniques will do away with punched card input; the more extensive use of printed circuits and micro-electronics will increase reliability and reduce the growth in demand for maintenance technicians and engineers; improved computer performance and the increased availability of computers which run several jobs simultaneously will reduce the need for computer operators; the simplification of computer languages will reduce the skills required to programme the machines. The range of possible manpower needs is quite considerable.

Organizational change

A second broad reason for embarking on intensive manpower studies arises when companies or organizations seek to increase their efficiency and reshape their structure. An excellent illustration of the impact of changing economic objectives on manpower was given by the closure of the British Railways' workshops.

In 1959, BR drew up plans to reduce the number employed in the workshops, in which rolling stock was repaired and built, from 73,000 to 62,000 three years later. By 1962, it was realized that further cuts would be required. The causes of this declining manpower requirement were simple economics—and a useful reminder of the inter-relationships of manpower and organizational objectives. There were several causes:[15] the replacement of steam locomotives by diesel reduced the amount of maintenance per mile run; the introduction of diesels reduced the total requirements of locomotives because diesels, unlike steam locomotives, can be operated almost continuously; it was decided that BR would not be manufacturing, but purchasing, the power units and transmission. By 1962, too, the wagon and carriage modernization programme was virtually complete and the use of steel in wagons in place of the traditional wood also cut down repair needs.

Comparisons between the 29 workshops highlighted the most efficient and a decision was made to close 12. Redundancy was inevitable.

Those redundant had special problems. The men had always expected a security denied to those in outside industry; other railway trades were declining and the demand for labour outside was low; some railway skills, indeed, could not be transferred outside. The essential feature was that very long notice—never less than six months—was given, redundancies were phased over three years and generous redundancy and resettlement payments were made.[16]

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[15] Contraction in the Workshops, by L Cook, *New Society*, 23 July 1964

[16] *Redundancy and the Railwaymen*, by Dorothy Wedderburn, CUP, 1965

The manpower plan of action that resulted from the studies of change in organizational practices, of demand for labour and the supply of labour, in this case revolved around redundancy. The manpower plans, to achieve given organizational ends, could as well mean recruitment, training or retraining as redundancy and redeployment.

The National Coal Board has faced similar problems over the past 20 years in matching its labour force to its production plans. The peak years of coal production were 50 years ago. Despite greatly increased energy consumption, coal output today is no greater than in 1947; in the foreseeable future, natural gas and oil will cause a diminished demand for coal. In 1947, the NCB had 1,000 pits; today it has barely 500 and by 1970 there will be under 400. In 1947, 711,000 were employed; in 1966, 490,000, nevertheless making the NCB the biggest employer in the world outside General Motors. A review of the coal industry by Robert Jones in the *Statist*[17] indicates the commercial and manpower problems, now that the NCB is fighting for its existence in a competitive fuel market where 200 pits produce 118 million tons of coal, making a profit of £55·5 million; 100 pits lose 10s a ton on 33 million tons of coal (loss of £8 million); and a further 184 pits, producing only 33 million tons, lose more than 10s a ton, creating a further loss of £55 million. The economic problem is that the Coal Board carries a deficit. The social problem is that the majority of uneconomic pits due for the axe are concentrated in Scotland, Wales and the North West. The problem for the Coal Board's manpower planners is the rundown of manpower with the minimum of redundancies, coupled with increasing automation in the best pits.

On the other hand, the pace of expansion can be great and can create new problems worthy of examination by a manpower analyst. In the 1950s, the oil industry expanded rapidly but at the same time, through increasing nationalist pressures abroad in newly emergent nations, opportunities for employment overseas for British managers declined. The resulting pressures have caused large-scale early retirement programmes to be introduced by the major oil companies to regain control over the manpower available in the company, and to meet changing company objectives. In the 1960s, educational institutions have grown as a number of new universities have been formed and technical colleges have expanded. New institutions require heads of departments and professors, and some in their early 30s have been appointed. This pace of educational advance will not occur again for perhaps 15 to 20 years; a tremendous promotional blockage will predictably develop in the 1970s and '80s in the universities, unless preventive action is taken. Either industry will have more people applying for appointments or there will be an increasing flow of emigrant lecturers.

Take-overs and mergers

The Acton Society Trust recently published a report[18] of studies undertaken on the impact of amalgamations and take-overs on organizations. It revealed, with a few notable exceptions, the tardiness of the acquiring company in explaining to the men on the shop floor and the girls in the packing-shop what the bid was about. Take-overs will become more common over the next ten years with or without the work of the Industrial Reorganization Corporation. Unless the personnel department is represented directly on the board, it will probably not know of the proposal. Yet it is important that work is done to assess the availability of extra labour immediately the bid becomes public, if not before. A production director may have required some thought before the bid was proposed about what is to happen to the new employees, but a detailed study of the integration of the work forces, cost of redundancy terms and manpower problems of reorganization will need to be done, in addition to the detailed assessment of plant and investment requirements.

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[17] 3 February 1967

[18] *The Human Effect of Mergers*, by Dennis Brooks and Randall Smith, Acton Society Trust, 1966

Mergers cause their problems too. As Rosemary Stewart[19] has pointed out, mergers may result in the conflict of two different philosophies of motivating the human resources of a firm. There may be different pension schemes. There may be a policy of delegated authority in one and tight central control in the other. One firm may believe in a straight salary for salesmen; the other in a low basic salary plus commission. Older managers may resent the merger because of the loss of the personal contact they had experienced in a smaller firm, while younger managers may welcome the wider opportunities given by the new organization.

Take-overs and mergers can be traumatic experiences: often they occur with the most meagre personnel details available.

Greater productivity

Increased efficiency does not necessarily mean organizational change but it is bound to call for manpower studies. First, the present situation requires study, to discover how good the present utilization of manpower is. Secondly, when plans are made to improve the situation, the manpower implications must be studied and evaluated. This is true of all methods of improving the effectiveness of the work-force, at whatever level.

Methods of increasing efficiency are discussed in Chapter 4, but all are management's responsibility and many will require much preliminary work. This is particularly true of the currently fashionable and promising field of productivity bargaining. One has only to look at the preliminary work put into the Blue Book by Esso Petroleum[20] to see what is entailed. The preliminary work at Mobil's Coryton Refinery was not the less because the unions were involved at an early stage. Management's role was emphasized by Esso in setting out what productivity bargaining is:

> "Productivity bargaining starts from the assessment of an operating problem and the statement of objectives based on careful management study. It is

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[19] *New Society*, 7 February 1963, How Mergers Affect Managers
[20] See *The Fawley Productivity Agreements*, by Allan Flanders, Faber and Faber, 1965

> more susceptible to systematic treatment. It can only come through management initiative and study and must be a success in the eyes of both the company and unions. It results in a bargain which produces benefits for both sides, instead of one side gaining at the expense of the other".[21]

ICI justified its initial steps in this area in the words:

> "The company had been applying new capital to the business in the United Kingdom at a high rate. In 1964, this amounted to £70 million . . . This is increasing rapidly the number of highly instrumented processes, and bringing with it a change in the nature of the work of employees. In addition, the progressive rise in the level of education is creating both the opportunity and the demand for individuals to be given responsibility and to develop in their work. The continuing rise in employment costs and the increasing competition that the company has to face require that urgent steps be taken to increase the efficiency with which employees are deployed".[22]

Discussions at the national level were started in ICI in July 1965. It was agreed by October 1965 that local negotiations would be carried out and, as soon as satisfactorily concluded, that trials embodying important developments in manpower utilization would be carried out,[23] such as:

- — employing production operators after training to carry out certain less skilled craft tasks;
- — tradesmen to operate plants in certain circumstances;
- — tradesmen and general workers to accept supervision by men of any background;
- — craftsmen can do work of other trades which form a subsidiary part of the main job of their own trade, according to availability.

Agreements of this kind have to be carefully evaluated beforehand. It is not easy to assess the tangible benefits that will arise from changes in working practices. What is it worth to a firm, in economic terms, to negotiate interchangeability of craft and operator personnel? Or to run its distribution vehicles 18 hours a day? Yet unless this exercise is done, unless the implication of the changed hours of work and conditions being proposed by management are calculated in advance, the productivity agreements signed may be expensive to operate and give the firm no benefit at all in increasing its operating profitability, which in effect means that it is not a productivity measure at all.

Moreover, the implications need detailed analysis in advance, because negotiation implies that changes will be made and evaluations must be possible as the bargaining process progresses. The kind of change Esso planned from its productivity negotiations with the Transport and General Workers Union on the distribution of petroleum products was given in its evidence to the Royal Commission:

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[21] Royal Commission on Trade Unions and Employers Associations, Minutes of Evidence 39, HMSO, June 1966

[22] The ICI Productivity Agreement, Paper to Industrial Society Conference, by E D France, John Rhodes, A V Johnston, June 1966

[23] *Ibid*

Benefits from productivity deal in distribution trades **(illustrative data only)**

	Before deal	*After deal*	*Per cent Increase/ (Decrease)*
Men	1,000	815	(18·5)
Units (vehicles)	500	312	(37·5)
Total cost pa £000s	£2,017	£1,670	(17·2)
Average hours worked per week	54	42	(23·0)
Average earnings pa	£1,065	£1,255	17·8
Capital commitment £000s	£5,000	£3,120	(37·6)

After any organization has negotiated a productivity deal it should ensure that it has a good bargain, and that the deal gives the results predicted. Management must continue to work hard to achieve its objective, and independent internal assessments before and after are essential. Many of the points made in the criteria for productivity bargaining laid down by the National Board for Prices and Incomes[24] should be observed by firms in any case in preparing and assessing their bargains, but they now have the additional need to measure their proposals against the Board's criteria, which are:

(i) It should be shown that the workers are making a direct contribution towards increasing productivity by accepting more exacting work or a major change in working practices.

(ii) Forecasts of increased productivity should be derived by the application of proper work standards.

(iii) An accurate calculation of the gains and the costs should normally show that the total cost per unit of output, taking into account the effect on capital, will be reduced.

(iv) The scheme should contain effective controls to ensure that the projected increase in productivity is achieved, and that payment is made only as productivity increases or as changes in working practice take place.

(v) The undertaking should be ready to show clear benefits to the consumer through a contribution to stable prices.

(vi) An agreement covering part of a plant should bear the cost of consequential increases elsewhere in the plant, if any have to be granted.

(vii) In all cases negotiators should beware of setting extravagant levels of pay which would provoke resentment outside.

Conclusion

The reason for undertaking manpower studies can therefore be seen to be overwhelming. They apply to large companies with greater force, but the small company also has to have the right manpower at the right time. The small company does not find it odd to make provision for future capital needs: provision for manpower needs is also necessary. The following chapters discuss the methods to be followed by the firm in manpower forecasting and planning.

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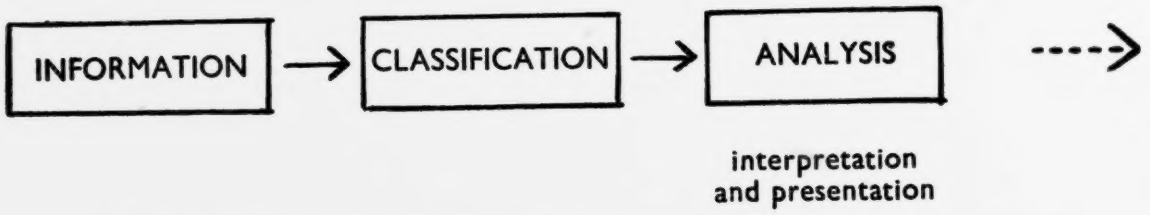
[24] National Board for Prices and Incomes, Report No 36, *Productivity Agreements*, HMSO, 1967, Cmnd 3311

Chapter 3—Manpower analysis

Manpower information

In order to be able to assess the forward needs of the company for manpower, to anticipate the consequences of reorganization, to prepare a new wage structure or to carry out other studies in a manpower programme, there is the prime need for a manpower information system on the organization's human resources.

Once the information is available and before much constructive action can be taken, it has to be classified according to the needs of the situation. Once classified, the data can be analysed and the findings presented in a variety of ways.



Having reliable data is no prerogative of a personnel department but many companies appreciate the need for information on sales and profitability more easily. But it is comparatively easy for an organization to be enveloped in mythology on its manpower. It may be that the organization imagines it has an 'old' work force when in fact there are equal numbers under 35 and over 45. One department will be thought to have a high turnover rate when it is in fact no higher than others which are thought to be relatively stable. Some managers may hold the view that those who have 'worked their way up in the firm' (whatever that may mean) are better (whatever that may mean) than others who have not. The prevalence of generalizations of this kind is inconsistent with good—meaning informed—management. No firm deserves to be successful if it adopts a similar mystique in dealing with finance and sales.

The kind of information needed on each employee is clearly dependent on the problems that are going to be analysed. An international marketing company, relying heavily on its sales force, may want to have available much greater detail on its salesmen (qualifications, sales-successes, linguistic ability) than another company preoccupied with substantial problems amongst its hourly-paid employees (craft, union, wages and bonus, overtime).

Certain basic information is almost invariably required, but again the need for detail will vary and can only be a matter for local decision. Much of this information is readily available through the application/engagement form or from training or transfer records.

The information summarized in the table below has been collected from a dozen or so large UK companies on the personnel data they have readily available for all employees, and its sources.

Personnel information

	Data recorded	*Large companies keeping this information readily available*	*Original source of of information*
1	Surname and Christian names	All	Application form
2	Address/telephone number		Application form
3	Date of birth		Application form
4	Date joined organization		Engagement form
5	Job titles and career history		Engagement/transfer form
6	Salary progression with date of change		Engagement/transfer form
7	Bonuses/commissions (as applicable)		Engagement/transfer form
8	Marital status	Most	Application form
9	Salary group/job grade		Engagement/transfer form
10	Date of leaving and reason for leaving		Leaving interview report
11	Previous commercial/industrial experience		Application form
12	Next of kin, relationship and address		Application form
13	Educational background/qualifications		Application form
14	Performance appraisal		Performance appraisal form
15	Employee number		Engagement form
16	Awards in company suggestion scheme		Suggestion scheme return
17	Registered disabled person		Application form
18	Member of company pension plan/number	Some	Pension plan entry form
19	Absence record		Medical records
20	Training received in company		Training return
21	Record of participation in educational refund plan (where applicable)		Claim form
22	Trade union membership		Application form
23	Relatives with company		Application form
24	Source of recruitment	Few	Application form
25	Record of any long service award		Long service award return
26	Aptitude test results		Training return
27	Foreign language ability		Application form

Performance appraisal

An important feature of the personnel function is a well defined and widely understood system of employee appraisal. It is an important part of manpower studies in general, since it provides the material on which resource studies should be based; the appraisal process must provide meaningful judgements about the performance and potential of employees. The kinds of problem in which the appraisal information would be of use would include:

> What generalization (if any) can be made about graduate engineers as a group, based on the appraisals they have received? How does their performance compare with the apprentice intake recruited five years

previously, straight from school at the age of 18? Again—how successful were the selection procedures used to recruit the last intake of salesmen, evaluated by the assessments received one year after completing training?

Many existing appraisal procedures may not provide this information either at all or in useful form. A further difficulty is that the procedure itself may not be effectively carried out. Appraisal procedures most frequently encountered require a manager to make judgements about the degree to which each of a number of qualities are present in subordinates. The extent to which this system is either desirable or effective is debatable: a study of six companies and 1,440 appraisals pointed to three weaknesses:[1]

(i) Appraisers are reluctant to appraise; they do not always fill in forms (either completely or at all) and the content of the entries may be evasive.
(ii) Interviewers are even more reluctant to interview.
(iii) Follow-up is inadequate.

Another study on the effectiveness of interviews has concluded that interviewers are more easily satisfied about the value of their interviews than the subordinates interviewed.[2]

A number of shortcomings of appraisal procedures, particularly those which require ratings on a number of factors, have been identified. These are summarized by J Tiffin and E J McCormick as the influence on each factor of the manager's view of overall job performance, the consistently lenient or harsh judgements of some managers, variations in ratings between departments and jobs and the influence of age and length of service of employee.[3] However great the difficulties, a manpower information system is not complete without evaluative records of personnel performance and promise.

Access problems

Personnel data is frequently retained in a variety of files: clearly a uniform system is ideal, provided that any particular category can be amplified to the desired extent.

The problems that arise in practice in having such personal data systematically available are considerable. Frequently, there is a lack of standardization throughout a company. An independent-minded plant well away from head office will design its own record system and decide to eliminate some standard items and include new ones. One section (eg a research and development establishment) will decide that it does not want to bother with records at all, maintaining stoutly that "all the employees are known personally".

A second problem concerns the availability of personal information when it is required. The information may be there but it cannot be conveniently retrieved.

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[1] An Appraisal of Appraisals, Kay H Rowe, *Journal of Management Studies*, March 1964

[2] Reactions to Appraisal Interviews, Rosemary Stewart, *Journal of Management Studies*, February 1965

[3] Some Dangers of Performance Appraisal, *Industrial Psychology*, 1965

All training records may be held by the chief training officer; all recruitment data by the recruitment section; and all wages and salary information may be held by departmental heads who will not permit it to be released except under extreme pressure. Access to information may be even more difficult when factories and sales offices hold their own information and do not normally make it available to a centralized personnel group.

A new company has different problems, the fundamental one being at what point it needs to keep records in any formal way. Large companies recognize the need; medium size companies can be persuaded, but small companies may think it practicable to carry information on employees on files in the manager's head.

There are considerable advantages in keeping one set of records only instead of, as frequently happens, payroll records (in the accounts department) which tell part of the story and personnel records (in the personnel department) which tell another. What will happen in particular firms will clearly depend on the traditions of the company, the place and the personalities. It is important to ensure that constructive work on manpower problems is not held up through lack of readily available information. The first priority therefore is to establish such a uniform system of holding information, used by all departments in all locations. The second is to ensure that the information is regularly updated.

Classification

The key to successful analysis lies in classifying the information in the most useful way. Office staff need to be classified for coding purposes into defined groups. Occupational titles may do this but the job titles may not be really descriptive of the job done, representing instead a legacy of management wishful thinking. Or certain girls may, for status reasons, be referred to as secretaries when their work is not distinguishable from that of the shorthand typists.

'Linguistic ability' could require separation into languages. How is a person classified/coded if he speaks French *and* German. How is ability differentiated —good/average/fair; spoken/written? And what if he writes German but speaks French well? Producing practical coding systems which cater for most requirements is a complex job.

It is probably not practicable to devise a classification system which would cover all situations; it would certainly be a waste of manpower resources to attempt it. There will inevitably be some occasions when a question is asked which side-steps the classification system adopted; then it is a matter of searching the available documents or contacting the departmental heads for more detail.

Basic classifications required throughout manpower studies would include sex, age-group in five year steps, service in five year groupings, department, educational attainment in appropriate categories, operative skills in suitable job categories. The detail cannot be prescribed in general and for all organizations but the system chosen will follow some such general lines.

Initially it is impractical to build up a system to cater for all problem areas that may be studied. Selectivity must be introduced from the first; the decisions taken at this early stage are important and merit high-level consideration and discussion. The criteria used to guide the choices made, both in the information held readily available and the classification system adopted, must relate to the primary problems that will be studied.

Information technology

One of the simplest methods of recording personnel data is the Kardex system, by which employee cards are held in the desired sequence in a cabinet of trays. The information is stored on these cards in 'raw' form, but there are facilities for introducing simple classification by tagging the cards with different colours. Alternatively, the personnel data can be held on simple punch cards.

Mechanized accounting is now widespread and the same principle can be extended to cover personnel records. An 80-column card is capable of holding much information. The detail is too specialized for consideration here but the principles are illustrated (Figure 1).

The information from the personnel record sheets is summarized on the punched card. The first 20 columns represent, say, the name and initials; columns 21-26 represent the date of birth; the next six the date of joining the organization; columns 33 and 34 a two digit departmental code, and so on.

Organizations are using computers increasingly to hold personnel information, in a classified form as well as in the raw information state. A useful guide to the application of computers to personnel work has been written by E Wille.[4]

The smaller the organization the simpler the system should be. Punched cards associated with mechanized sorting have many advantages: the system is flexible and the manpower analyst has the information readily to hand. Computer storage offers ease of updating and personnel records can be conveniently integrated with payroll changes. However, the present generation of computers have certain technical disadvantages, the chief one being the difficulties of retrieving data from the system. The existence of a sophisticated record system, which is inaccessible for quick practical purposes, is of diminished value.

Analysis of data

One kind of analysis has already been suggested, that of simply relating the jobs to some other variable, such as participation in an educational refund plan, occupational pattern by department or occupation by service with the company. The combinations are endless and a great deal of discipline is needed to prevent the personnel department being buried in an avalanche of interesting but largely irrelevant analyses. Again, it is important to ask the right question. An organization might be concerned about the age pattern of employee turnover in different departments: it could have the information in five minutes from punch cards.

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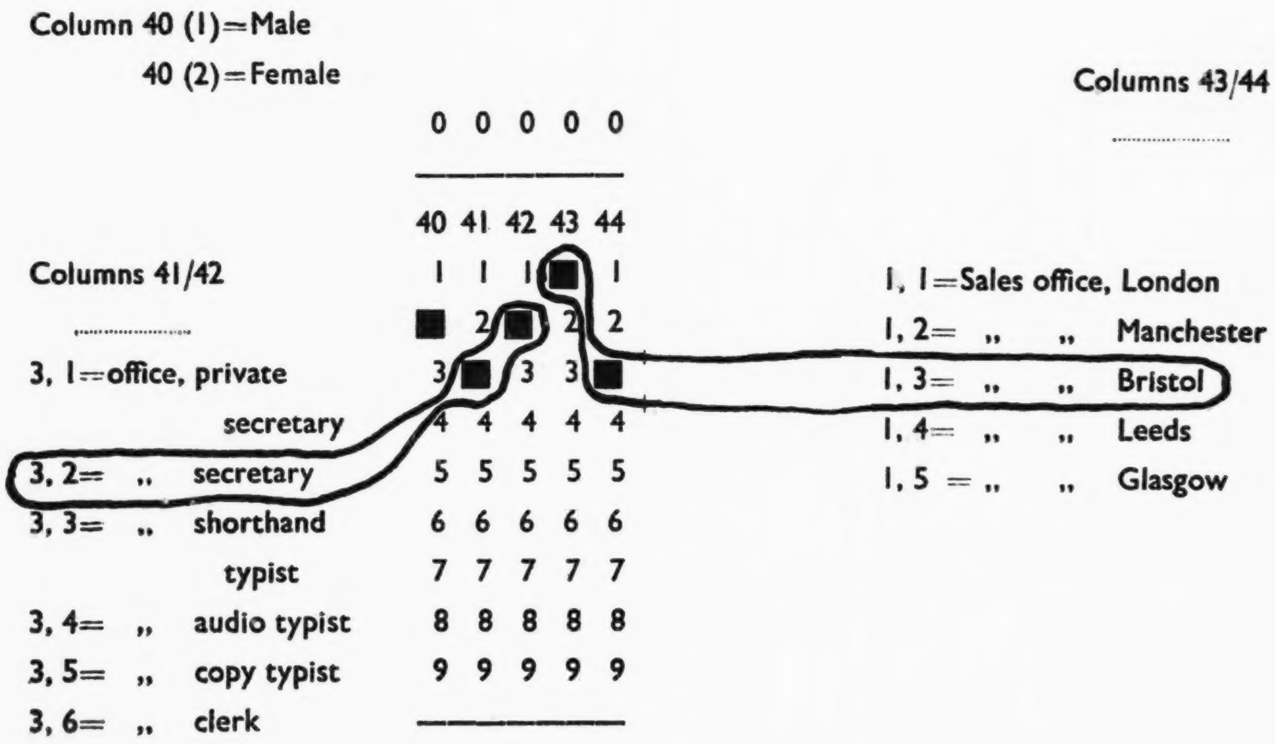
[4] *The Computer in Personnel Work,* by E Wille, IPM, 1967

Figure 1

Punched card record of personnel information


Column 40 (1)=Male
40 (2)=Female
Columns 43/44
0 0 0 0 0
40 41 42 43 44
Columns 41/42
1 1 1 ■ 1
■ 2 ■ 2 2
3 ■ 3 3 ■
4 4 4 4 4
5 5 5 5 5
6 6 6 6 6
7 7 7 7 7
8 8 8 8 8
9 9 9 9 9
3, 1=office, private secretary
3, 2= ,, secretary
3, 3= ,, shorthand typist
3, 4= ,, audio typist
3, 5= ,, copy typist
3, 6= ,, clerk
1, 1=Sales office, London
1, 2= ,, ,, Manchester
1, 3= ,, ,, Bristol
1, 4= ,, ,, Leeds
1, 5 = ,, ,, Glasgow

Read as: Columns 40 (2); 41/42 (3, 2); 43/44 (1, 3)
=Female; secretary; in Bristol Sales office.

A comprehensive *manpower audit* can provide management with a picture of what has happened to the manpower resources of the organization in the past year.

Extract from company manpower audit
Year ending 31 December 1966

1965		*1966*	*Change*	
4,800	Total employees (full and part-time) year average	5,100	+ 300	(+ 6·3%)
	Production	2,600		(+ 8%)
	Marketing	1,900		(+ 3%)
	Corporate	600		(+ 10%)
82·6%	Percentage full-time employees	79·3%		
69·3%	Percentage men in labour force	65·4%		
43·0 years	Average age: Men	43·1 years		
24·5 years	Women	23·5 years		
30%	% total employees under 35	40%		
42%	35–45	36%		
28%	over 45	24%		

An analysis of this kind raises a large number of questions, not only for supplementary information—a process which can go on indefinitely—but also for greater description and explanation of the significant facts.

The narrative accompanying the extract from the company manpower audit could highlight an increase in the total labour force, 1966 over 1965, which was mainly attributable to the production department. "This was due to an increase in the numbers of young, part-time women employees. The increase in the number of sales staff arose from the termination of a number of agreements with agents, which necessitated an increase in the number of sales representatives and assistants. The net increase in the head office personnel was due to the installation of the computer: it is understood that this increase is merely temporary and will be followed by a reduction of 10 per cent in 1967 and a further 10 per cent in 1968."

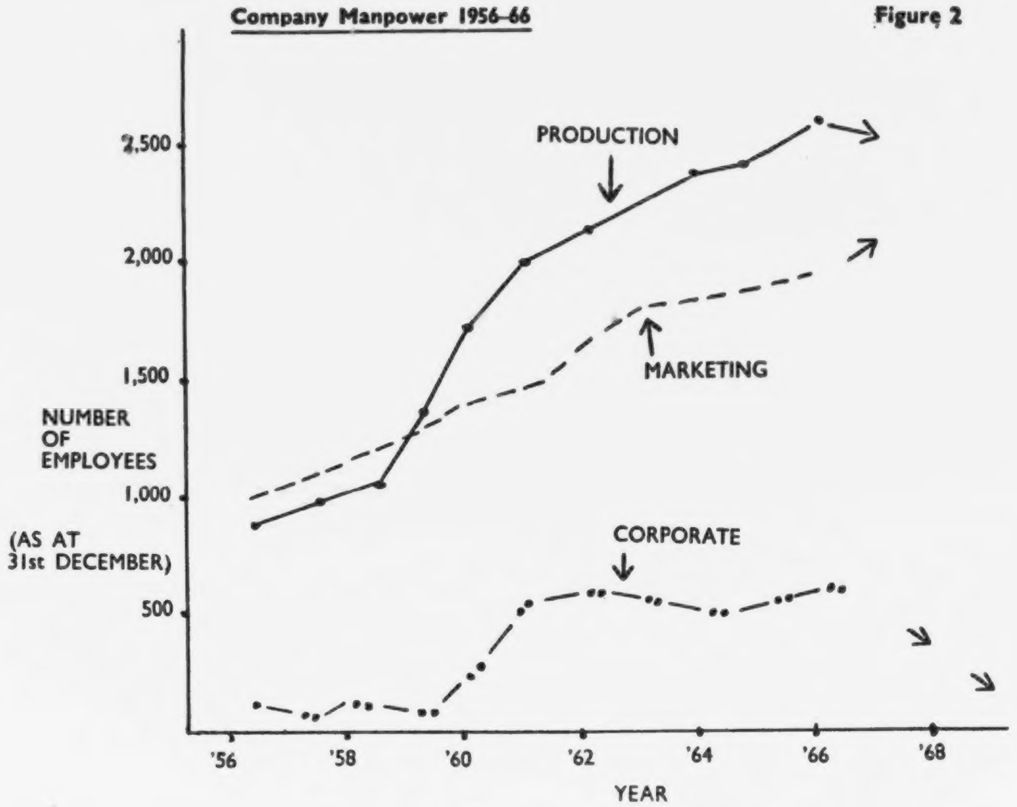
Presentation of data

Tabulations have their uses, but graphical representation is much more helpful in highlighting issues for management attention. One method of showing the changing pattern of employment in an organization over a number of years is given in Figure 2. The present age distribution of manpower is more appropriately presented in a histogram than a tabulation (Figure 3).

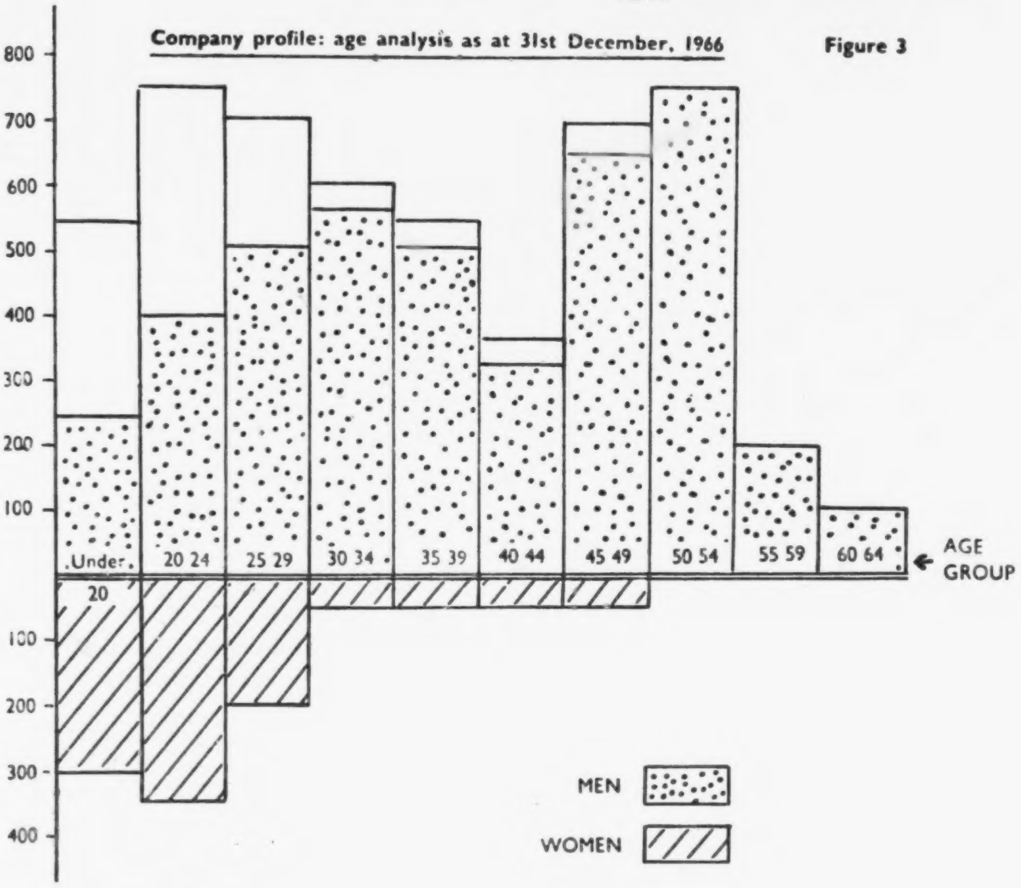
However, a word of warning is necessary.

It is unfortunately too easy to be hypnotized by the past. It is not difficult to build up a library of charts to show what *has* happened. The growth of and changes in particular functions can be charted; this is useful, as indeed is any dossier of data on what happened in the company last year. The next step is more important: why did these events happen? Why, for example, was the turnover of operators twice the rate in 1966 of any previous year? Why, despite an active recruitment policy (and the highest ever recruitment expenditure!), has the company on its books fewer draughtsmen, skilled crafts-

Company Manpower 1956-66 Figure 2



Company profile: age analysis as at 31st December, 1966 Figure 3



men, engineers, graduates or secretarial staff than it had at the end of the previous year?

Description of the past and the present is one facet of a manpower study programme. If the contribution is to be a fully recognized function in an organization, the emphasis must be consistently on the future. What is going to happen will not be simply a projection of what has happened.

Organization

The prime function of the personnel department is to help ensure that the organization has the people it needs in the right place at the right time. The personnel function is thus geared towards action in its recruitment drives, its training programmes and its involvement in negotiations with trade unions. The aim of manpower investigations is to complement these responsibilities and to ensure that action by personnel departments is always concentrated on the most relevant problems of the organization.

The manpower group may be located within the personnel department's orbit or within the central resource planning department of the organization. Wherever it is, it is essential that the head of the manpower group, perhaps called the manpower adviser, has the full confidence of senior line management and the board. He will only be effective if he is fully familiar with the short and longer term objectives of the organization.

The manpower group will need a number of analysts to carry out the kinds of studies suggested in this pamphlet. Providing that they can gain the confidence of other members of the personnel department, there is no reason why people suitable for this work could not be found in other departments of the company. Perhaps, ideally, a blend of personnel specialists with an economist and someone with a statistical background could form a manpower group. Whoever they are, they need both analytic and visionary skills.

There will be certain suspicions voiced that there is something Machiavellian about the existence of manpower specialists. It must be said at once that firms which do not look as objectively as possible at their human resources are the ones which should be viewed with suspicion. It is the absence of such studies which deserve critical comment. We are living at a time when changing technologies will transform the work environment; it is therefore necessary to look ahead and face the implications of computer, automation and modernization, and not ignore the changes by looking no further ahead than present day welfare problems. Profits will be harder to earn; costs will have to be kept down; productivity (associated with changed working practices) will have to be increased. All this will call for retraining and redeployment: such programmes will be accepted more willingly, and with greater co-operation by employees and management, if it is clear that the short term and long term implications have been examined and assessed clearly and constructively.

Chapter 4—Manpower utilization : the first priority

The initial task for the manpower group is to assess which problems facing the organization are the most pressing. Information, classification and analysis are procedures common to many studies—whether greatest attention is given to forecasting the organization's future manpower needs, the forward supply situation or making the best use of existing resources.

The present economic climate gives priority to consideration of productivity. Translated into a manpower context, this gives the highest prominence to the question of manpower utilization. What is the value contributed by indirect labour? What does the design office do with 40 draughtsmen? Why are so many men needed to maintain the boilers and the heating system? Would three technicians and one research chemist be as effective as three research chemists and a shared technician?

It is important to distinguish crude comparisons of manning, ie total numbers of people employed, from the more meaningful analyses of manpower utilization. Manning comparisons invariably oversimplify the problems: manpower analyses seek to expose the critical, underlying assumptions. Manning is about the *quantity* of people employed: manpower studies should place the emphasis on *quality*.

This chapter examines both of these aspects. First, the various manning comparisons and indices that are used are examined; next some examples of manpower utilization are examined in greater detail.

Manning comparisons

Too much cannot be read into international comparisons of manning indices but Anthony Bambridge made some interesting comparisons in the *Sunday Times* on this subject:[1]

Manning Comparisons

Criterion	*UK Company*	*International comparison*
Number of men to:		
produce £1 million of steel	Stewarts & Lloyds (259)	Youngstown Steel and Tube, USA (95)
produce £1 million of chemicals	ICI (167)	Du Pont USA (101)
produce £1 million of motor vehicles	BMC (82)	Volkswagen (WG) (75)

The point has been made repeatedly in the press that, by international standards, British industry requires two to three times more men per unit of output than does industry in the United States.

The American business consultant has frequently commented that British industry is overmanned. He regards the half a million men employed as mates as an anthropological status symbol, costing the country £500 million a year. Manufacturing industry in his view is, therefore, overmanned rather than undermanned. Evidence for this is readily found by international comparisons, company with company, of the type illustrated above. William Allen claims that the results of work measurement show that few people work more than 50 per cent of their time and that a good number work less than that.[2]

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[1] 8 August 1965

The PIB report on the railwaymen's pay[3] indicated that manpower on British Rail could be reduced by 20 to 30 per cent without loss of efficiency. The Royal Commission on the Press in 1962 reported that a saving of a third could be achieved in the manpower employed on the production and distribution of four British national newspapers.

International manning comparisons and indications of wasted manpower resources tell only part of the story. There is a far greater incentive for US management to reduce the numbers employed than there is for British management. Labour costs are lower in this country by a factor of three to four and, in addition, the cost of social benefits is borne by general taxation, although in many other countries a higher proportion of the cost falls directly on the employers of labour. Figures from the European Free Trade Association's economic and social committee, published by the TUC, show Britain to be below many of her competitors in direct wages per working hour and below almost all of them in total wage costs per working hour.[4] In terms of simple economics British industry may consider it is being more rational than may appear at first sight. However, no organization should be satisfied if it has good reason to believe it has resources which are not being used efficiently; for even if the over-manning does not cost much directly, the true cost to the nation is the alternative value of the wasted men's skills. It is in the national interest for individual companies to use their manpower resources more efficiently.

The true interpretation would seem to be that one of the causes of Britain's economic difficulties is that management has insufficient incentive to ensure that its manpower resources are used with the greatest effectiveness. A payroll tax, or the transference of a greater proportion of social security payments to employers, would certainly provide the economic incentive to improve manpower utilization.

Manning indices

Although there may not yet be great economic incentives for the firm to take action, comparisons of manning or productivity indices can highlight areas in which manpower is not being used with greatest effect. 'Productivity' itself is a term which can be the base of much pertinent philosophical discussion, but here it is simply equated with some quantitative measure of output per man.

It was international comparisons of barrels of crude oil refined per day/man

[2] *Sunday Times*, 6 November 1966
[3] PIB Report No 8, Cmnd 2873, January 1966
[4] *Financial Times*, 18 April 1967

and investment/man that prompted Esso's American parent company to press for the productivity improvements at the Fawley refinery.

A variety of indices can be used to assess productivity in another capital intensive industry, electricity supply. One such index, installed generating capacity in MW per power station employee, could be used to make comparisons between different electricity generating stations and might lead to a better understanding of the factors affecting productivity.

However, such a simple index is likely to prove unhelpful in practice: some power stations will be oil-fired, some coal-fired and each type will have different manpower requirements; some power stations will be older, less well designed, and possess more man intensive equipment and this, again, makes fair comparison difficult; and, finally, certain power stations will be specifically designated for use in peak-periods only, and this intermittent use would offset the output per man equation.

A simple manning index is also unhelpful since it is insensitive to increasing labour or capital costs: if the cost of manpower is increasing, management needs to take this into account in its decision making; yet if the organization is looking solely at a manning index, it is blinding itself to the real facts. Conversely, if capital becomes relatively dearer, then the company ought rationally to respond by using cheaper plant which is more labour intensive. An economic index, which expresses men, materials and capital in the same terms has considerable advantages, because it enables management to consider manpower and capital investment as real alternatives.

This has been well illustrated by the work of Electricité de France. In *Les Progrès de Productivité et leur Utilization à l'Electricité de France* 1962[5] an attempt is made to bring together various indices of productivity into an 'index of global productivity'. The authors comment that an increase in the usual index of output per man does "no more than allow a presumption of progress and certainly does not measure it".

Manning indices are more useful in suggesting further areas for more detailed study than in giving rise to immediate action that should be taken to improve manpower utilization. They are crude, too, in that they do not differentiate between the tasks performed: management and mail boys tend to be equal in the sight of a manning ratio. Furthermore, if a company does opt for the unreal objective of a fixed manning establishment as an end in itself, it is in danger of failing to see that by meeting manning targets it may increase its costs by using more costly agency services, and it is emphasizing quantity in its labour force when it is the quality of its work force that will determine the satisfactory achievements of its true objectives. An organization would therefore be wiser to attempt to control its total wage and salary bill rather than the total number of employees. The company would be wiser still to postpone consideration of manning ratios completely and put all its management effort into examining how effectively it is deploying the manpower resources it has available.

[5] Études et Conjonctures, January 1965

Studies in manpower utilization

Parliament and the police

When Parliament is sitting, the use of traffic lights on the corner of Parliament Square is suspended and policemen on point duty take over. Although crime is on the increase and the police force under establishment, no less than 328 hours of policemen's time is taken up daily in supervising the incomings and outgoings of the Palace of Westminster! This is hardly an example to the nation, nor for that matter is the amount of time spent by members of Parliament waiting for division bells for results which are in practice largely predetermined. In addition, two working weeks are wasted each time members of Parliament troop into the division lobbies.

The present Home Secretary, Roy Jenkins, has been actively encouraging the amalgamation of police forces. In May 1966, he announced plans to reduce the number of police forces from 117 to 49. The advantage of amalgamation is that it eliminates the duplication of administrative functions and permits the forces to be better equipped for combating crime. It will have the effect of reducing the number of chief constable posts and this has the same implications for police career structure as the introduction of large comprehensive schools has on the opportunities of headships for teachers.

In 1966, the *Sunday Times* reported on the results of a study of the police force.[6] The Police Federation, in support of a pay claim in 1965, had argued that "owing to serious manpower deficiences and lack of equipment, the police forces of Great Britain are in grave danger of losing the war against crime". The official establishment figure is 95,000 and the police force is currently short of 15,000 men; there are serious deficiencies in the numbers—up to 25 per cent of establishment—in particular locations in the country. However, the critical question is how many police there *ought* to be. The estimate depends on the duties they are expected to perform and how effectively the available manpower resources can be deployed. The *Sunday Times* study showed that the policeman spends 45 per cent of his time on the beat: is this the most effective use of his time? The Lancashire Constabulary at Kirkby, near Liverpool, replaced eleven foot-patrol beats by five mobile beats in 1965, and in this way overcame the policeman shortage, simultaneously increasing the crime detection rate from 29 to 37 per cent.[7]

Care is required in interpreting the results of studies of manpower utilization. If the objectives of a police constable's job are defined in terms of spending 45 per cent of his time on the beat, there is no justifiable criticism—policemen are simply fulfilling the requirements of their role. It is only when it is stipulated that, in fulfilment of his job, no more than, say, 20 per cent of his time should be spent patrolling the streets, that just criticism can be made.

A precise definition of the objectives of a job is thus crucial to meaningful

[6] 9 January 1966

[7] Chief Constable of Lancashire, Mobility Answer to Police Shortage, *The Times*, 26 January 1966

studies of manpower utilization; otherwise such studies are made in a vacuum. A thorough job analysis and a clear job specification are fundamental to intelligent manpower utilization analysis.

Educational facilities

School teachers have complained that they are expected to undertake menial tasks which do not call for their professional skills, eg collection of dinner-money, playground and school meals supervision. An objective examination of this and also of the way teachers spend their time in the classrooms could also call into question why it is that fifth forms are traditionally taught in groups of about 30, sixth forms in groups of 15, and the same young people, a year or so later at college or university, in groups of 50 or a 100!

School and university buildings need to be used more efficiently. A university lecture room, costing say £5,000, may well only be used for two or three hours a day, five days a week, 24 weeks a year. Compare this with the use of a £5,000 road-delivery vehicle used 12–16 hours a day, six days a week, for 50 weeks a year in industry. If better educational plant productivity is to be achieved, it will only be brought about by a radical change in the conventional ideas on the deployment of teacher and lecturer resources. Lord Bowden has recently suggested that a four term University year would make far more effective use of education's capital and human resources.

Local Government

After Frank Harris was appointed Principal City Officer of Newcastle, he produced a report in February 1966 which showed that there had been over 1,000 council committee meetings in Newcastle in 1965 and that the average number of hours put in by councillors was some 200. Both political parties in Newcastle agreed in principle that there could be a more effective use of time: Labour proposals cut down the number of committees from 37 to 18; the Conservatives, following broadly Frank Harris' recommendations, supported the need for a Municipal Relations Committee to plan the work of committees, a Resources Planning Committee to co-ordinate and allocate resources and six functional committees. Increased efficiency and improved manpower utilization inevitably lead to the loss by some of positions of power which are given up only with reluctance.

Salesmen

Studies of how salesmen use their time reveal that a very considerable proportion of the time is spent in travelling from one customer to the next.[8] The amount of face-to-face customer contact is surprisingly small. More effective planning of sales areas, routes and customer calls can generally increase productivity immensely.

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[8] Raymond Tarrant (Rank-Hovis-McDougall), quoted in *The Times*, 31 March 1966

Analysis of an 8 hour salemen's day	*Per cent*
Customer contact	16
Waiting time	13
Travelling between customers	39
Sales reports and administration	6
Meals/social talk	26
	100

In some companies, organization and methods personnel are used to examine this kind of problem: activity sampling procedures are well developed. The manpower analyst should certainly draw on O & M experience in such areas but invariably such studies have wider implications for personnel practices generally, eg recruitment criteria, salaries, career planning and forward needs for manpower.

Again, the specification of the objectives of a salesman's job is vital. If his job is defined in terms of only 16 per cent customer contact, these salesmen and their managers are beyond reproach; but if the objective is to spend 30 per cent of the time with customers, the situation calls for radical changes in the pattern of working, the sales areas, or the sales responsibilities.

Engineers and scientists

Engineers and scientists are scarce and are likely to remain so. It is therefore particularly appropriate to enquire whether the best use is being made of these scarce resources. How many scientists of graduate or doctorate level are carrying out non-essential research work, or are spending a good proportion of their time on non-specialist activities?

It may be that a company employing scientists and engineers in research functions is over-recruiting for the work available. There is a suspicion that some companies recruit PhD scientists basically for status reasons. Many organizations have done little or no analysis to decide the skills required in research assignments, and have certainly hardly ever set out to discover whether they can be found in newly qualified first-degree men, or even in bright 18 year olds with A levels in science.

A survey of mechanical engineers by Denis Pym uncovered several causes of dissatisfaction.[9]

Dissatisfaction	*% checking items*
Misemployment on tasks not requiring your abilities	52
Lack of clearly defined work objectives	40
Too much paper-work	46
Insufficient supporting personnel (technical)	43
Insufficient supporting personnel (general)	42

Although surveys of this nature raise questions of comparability of responses, due to different interpretations given to the questions, the results are sufficiently clear for it to be reasonable to have misgivings about the ways these mechanical engineers are employed—a particularly relevant issue when they are critically scarce.

[9] *Occupational Psychology*, 1964 and 1965

Pym also makes some pertinent comments on a survey he carried out on 140 salesmen of electronic equipment, the majority with technical qualifications. Analysis of the way they spend their time showed that it was divided as follows:

%		
14	Selling	Less than half the time is being spent on their main activities: the same men carry out sales and technical functions.
28	Technical/Systems	
13	Travel	
45	Other	

The small percentage of time spent with customers might either indicate a distaste or inability for the work, or that the selling problem was not being tackled effectively. Pym comments: "The evidence indicates that the marketing operation, in view of the nature of its main tasks, is badly balanced with respect to both the kinds and levels of skill possessed by its personnel".

These examples emphasize the relevance of the analysis of the skills necessary for success in a particular area. Recruiting school leavers with mathematics at A level to be computer programmers is a frequently found example of using a simple recruiting formula which has no adequate basis in fact. Analytical skills, amongst others, are needed for successful programmers: other school leavers besides those who have taken A level mathematics possess such skills. Indeed, the matching of skills to industrial tasks may cut right across formal qualification boundaries, as has been illustrated in an oil company.[10] Studies carried out at the London School of Economics suggest that "it is not the case that one particular education experience requirement stands out as obviously right for each occupation".[11]

Restrictions on output

The problem of wastage of manpower resources is very great on the shop floor. The *Sunday Times*[12] featured two articles on restrictive practices in British industry which high-lighted some of the more obvious examples of wasted resources—the four separate craftsmen (joiner, driller, fitter and caulker) needed to fit a cabin door-stop in the shipbuilding industry, and the distinct types of porters (drawersback, pitchers, humpers and bummarees) who carry meat around Smithfield Market.

Restrictive practices, low basic pay, systematic overtime and overmanning are all interrelated. Success in overcoming the problems of restrictive practices and so improving manpower utilization will not be achieved until all the interdependent factors are modified simultaneously. The build-up of pressures on management as costs and wages rise will bring about an increased determination to tackle these problems as, in a labour intensive industry, their solution can be seen as the only way to an economically viable future.

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[10] The Manpower Needs of Industry *CRAC Journal*, Autumn 1964

[11] The Utilization of Educated Manpower in Industry, M Blaug, M Peston, A Ziderman, Oliver and Boyd, 1967

[12] *Sunday Times*, 20 and 27 February 1966

Objectives are crucial

The results of studies in manpower utilization cannot be evaluated without knowledge of the ideal or expected pattern of manpower deployment. As has been said, this places the establishment of job objectives in a central role.

This is a development beyond job analysis, which may reflect the established pattern of activity rather than the pattern of activity that *ought* to exist. The setting of job objectives is a task for management and involves the continual questioning of the existing methods of working and present achievements.

Once the objectives have been closely and unambiguously defined, the manpower adviser and analysts can call on the services of operational research analysts, organization and methods personnel and social scientists to suggest how the desired ends can be achieved. The studies in manpower utilization described are thus only a beginning; they uncover the present reality. Management demonstrates its right to manage, by relating what is actually happening at the present time to the objectives it would like to see achieved.

Chapter 5—Manpower forecasting

The previous chapter has been devoted to examining the problems of studying manpower utilization. Such a study is a necessary preliminary to any consideration of future manpower requirements. No forecast of manpower demand can be based on firm foundations until it is clear that the present resources are those most appropriate to the tasks being performed. It is easy but naïve to assume that, if the company's research effort is to be doubled, then twice as many R & D engineers will be required. Indeed, it could be that the existing research and development engineers are effectively employed for only half their time. Doubling the research effort could therefore be achieved with the same number of personnel, if they were more effectively deployed.

Organizations, then, need to preface their forecasts of future demand for manpower with thorough studies of manpower utilization. It would be more useful if more public attention were focused on using existing resources more effectively and less on the needs of the 1970s. Once a firm basis has been achieved, an organization has two problems. It has to predict the number of people it will need in terms of quantity and quality. In addition, it has to forecast how many of these people can reasonably be available from two sources. Some will come from within the organization and these estimates will take into account turnover and employee skills and preferences. Others will come from outside, and so forecasts of supply will need to take into account the inputs into the total labour pool, from the educational system and retraining, and the demands that will be made by competing organizations for the same labour.

Forecasting demand

No forecast of forward demand for manpower by an organization can be more precise than the formulation of the organization's overall objectives for that period. Such a statement of objectives for, say, three years ahead may only be expressed in the most general terms by its directors; it may not be formulated at all. Different organizations have differing time spans depending on the predictability of the markets they serve: some, eg the Civil Service, can assume a perpetuity denied to others. Nevertheless, training programmes of an organization, eg apprenticeships, involve commitments which may extend beyond the period for which precise commercial objectives can be set.

Establishing objectives

A company marketing and producing dishwashing machines might aim for a 50 per cent share of the market by 1970; if so, what will this mean in terms of the actual number of dishwashers sold? The growth of the dishwasher market will probably be dependent on the growth in gross national product—and what is that going to be? Another company may have an objective stated in terms of a 20 per cent return on capital. Yet another may be thinking in terms of a total number of units sold. Each statement of objectives has different implications for manpower, both in production and in distribution and sales, and so the manpower demand is determined by the objectives the organization sets itself.

The implications of different organizational objectives for manpower required is well illustrated in the public services. The Civil Service is being scrutinized by the Fulton Committee. Evidence being submitted recommends, for example, a widening of the recruitment channel, and the breaking down of traditional caste structures within the Service, but the necessary preliminary is to decide what the aims of the Civil Service should be. A Civil Service which enables a government to control the economy by direct intervention in industry has a different manpower requirement from a Civil Service which enables a government to control the economy principally by fiscal means.

The manpower needs of the medical services are dependent on the functions of hospitals and general practice. There is a great deal of current discussion on the group practice in which a number of GPs, social workers, nurses and other technical assistant staff look after perhaps 10,000 people. The present pattern of medical care would call for, perhaps, five general practitioners: the group practice might only require two full-time doctors and one part-time doctor, but ten part-time nurses. At present, too, family doctors may lose touch with patients admitted to hospitals: it could be that, in future, a principle of continuity of care would enable GPs to perform minor operations at hospitals and to continue to look after their patients. Such changes would have a pronounced effect on the need for doctors both in hospital and general practice, as well as offering new opportunities for qualified nurses and establishing a need for a new kind of medical technician.

Changing patterns of retailing, too, make an impact on manpower needs. Lord Cole, chairman of Unilever, said at a conference in May 1966, "If economy and efficiency were the sole criteria, half the 143,000 grocery stores in this country included in the 1961 census would probably no longer exist by 1970". Only 40 per cent of this country's sales go through self-service and supermarket operations at present compared with 90 per cent in the United States. Such UK sales, however, could rise to 70 per cent by 1970. One Swedish department store reduced its manpower from 1,200 to 800, without any effect on sales: some British stores have increased their sales of greeting cards and haberdashery following the introduction of self-service. Self-service, with attendant reductions in full-time manpower requirements and increased part-time staff, is spreading. It is not only more economic from the firm's viewpoint: it appears to be, in many cases, what the customer wants.

The energy industries are in a more fortunate position than most in being able to predict the total energy needs of the country in 1975 with, possibly, a fair degree of consensus, if not ultimate accuracy. Yet an individual company or public utility has the problem of forecasting how much of the total energy demand it is likely to hold. Such estimates are continually changing: the balance between the primary fuels, coal, oil and natural gas has been changed in the past year by the discovery of North Sea gas. This will have the most important impact on manpower in the gas industry, for conversion of equipment, and in the steel industry for pipelines to bring the gas ashore. Two years ago, these developments seemed far away, and yet the organizational aims, the economic objectives and the manpower needs of the organizations have all changed in consequence.

It is not only the unpredictability of the market place, and the dramatic arrival of new products, that can upset a statement of organizational objectives: other factors, quite outside the control of an individual company, can change its whole mode of existence.

Outrageous fortune

The construction industry operates under conditions in which it is very difficult to assume a great deal about the future. It invariably suffers a set-back at a time of national economic adversity. At the beginning of 1966, the construction industry was looking forward to a year of continued expansion. Yet, by August, road building projects were being cut, private house-building slowed, and the year's objective for new dwellings was not met.

The motor industry, though assured of an expanding future, is another which is badly hit by an economic squeeze. Consumer expenditure is damped down, the sales of consumer goods declines, and people are redundant. The extent to which this happens depends on the foresight of the individual company. Sensitivity to the building up of stocks in show-rooms associated with a slackening of sales should demand a slowing down in the rate of production. The organization is then in the right state of mind and preparedness to deal with an economic squeeze when it arrives. Serious manpower problems can thereby be avoided.

Yet these industries are intrinsically growth industries with an underlying upward trend even though sales may fluctuate from year to year. Projecting the long-term forward demand for the product is more difficult in other industries, eg the aerospace and textile industries. Even when the industry trend has been evaluated, the future for the individual firm is more unpredictable still. The aerospace industries have depended in the past for 75 per cent of their business on government contracts, and in 1965 the industry had three of its main projects cancelled. The committee under Lord Plowden, which reported in December 1965, commented that "erratic Government policy in defence procurement during the last decade had denied industry the consistent objectives and stable programme needed for success". The profit record of the industry, as measured by return on capital employed, has sunk from around 20 per cent in the early 1950s to around 7 per cent in the 1960s.[1] In such a climate the difficulties of the industry in producing meaningful indications of the manpower it needs are immense.

Economic pressures may force organizations to become more efficient as profitability declines. Two facets of increased effectiveness will be improvements in manpower utilization within the same plant and the introduction of more efficient processes or plants. Both of these will affect the forecast of manpower requirements.

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[1] The Aircraft Industry after Plowden, *Financial Times*, 18 December 1965

Improved efficiency

United Steel spent £12 million on the reconstruction of the melting shops, thereby reducing the labour force by 1,000.[2] Samuel Fox Ltd substituted for an open hearth furnace an electric process and half of the 500 men employed were no longer required.

The increased size of road-tankers of improved design, now permissible under changed regulations, enables 6,000 gallon vehicles to be used whereas ten years ago trucks carrying a maximum of 1,000 or 1,800 gallons were in the majority.

Productivity in the production plant will be increased by more effective investment in machines: computers will increase office productivity. However, new machines will also usher in new forms of business activity, more sophisticated control systems for management and more complex maintenance problems, which in turn will have implications for the demand for certain kinds of manpower.

There are other factors that can upset the most carefully laid plans for the future pattern of the organization, economic outlook and manpower needs.

Mergers and diversification

Any company can be significantly affected by a take-over or merger. In 1966 alone, Chrysler took control of Rootes, BMC merged with Jaguar and Tube Investments acquired Churchills. This trend is likely to continue, since there are many companies in a precarious financial position and others with the available cash. Where rationalization does not occur spontaneously, the resources of the Industrial Reorganization Corporation will assist in combining smaller companies into more effective larger units.

A company, too, will diversify its interests in order to acquire a guaranteed future for itself. Hawker-Siddeley burned its fingers when the Government cancelled the TSR 2 project and the company announced that it had been reducing its dependence on defence contracts by extending activities into other fields, for example, high duty alloys, electron-beam welding and in the provision of propellers for hovercraft.[3]

In the United States, Textron began in textiles and has diversified into other fields from animal feed to helicopters. General Mills, a large American food processor, developed a variety of new markets, including chemicals and electronics, but cut back when it realized the great opportunities still remaining in the convenience food business.[4] In this country, ICI now has a heavy investment in meeting the needs of the construction industry and it and other chemical companies are keen to replace traditional building materials by synthetics.

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[2] *New Society*, 18 August 1966

[3] May 1966

[4] Building on a Company's Existing Strengths, Geoffrey Owen, *Financial Times*, 12 May 1966

Complexities in forecasting

All in all, therefore, producing the forecast of manpower demands for an organization is a highly complex activity. Fundamentally, the company's objectives must be stated in such a way that it is possible to interpret them in terms of a manpower involvement. The manpower forecast must be done in association with the economic forecast; if done independently they could be mutually irreconcilable, since the achievement of particular economic ends will call for specific human resources. Even when this exercise is done, there is still ample opportunity for economic and manpower forecasts to be wildly out as a result of political decisions, new technology or the unexpected failures or successes in bringing about improvements in efficiency and productivity.

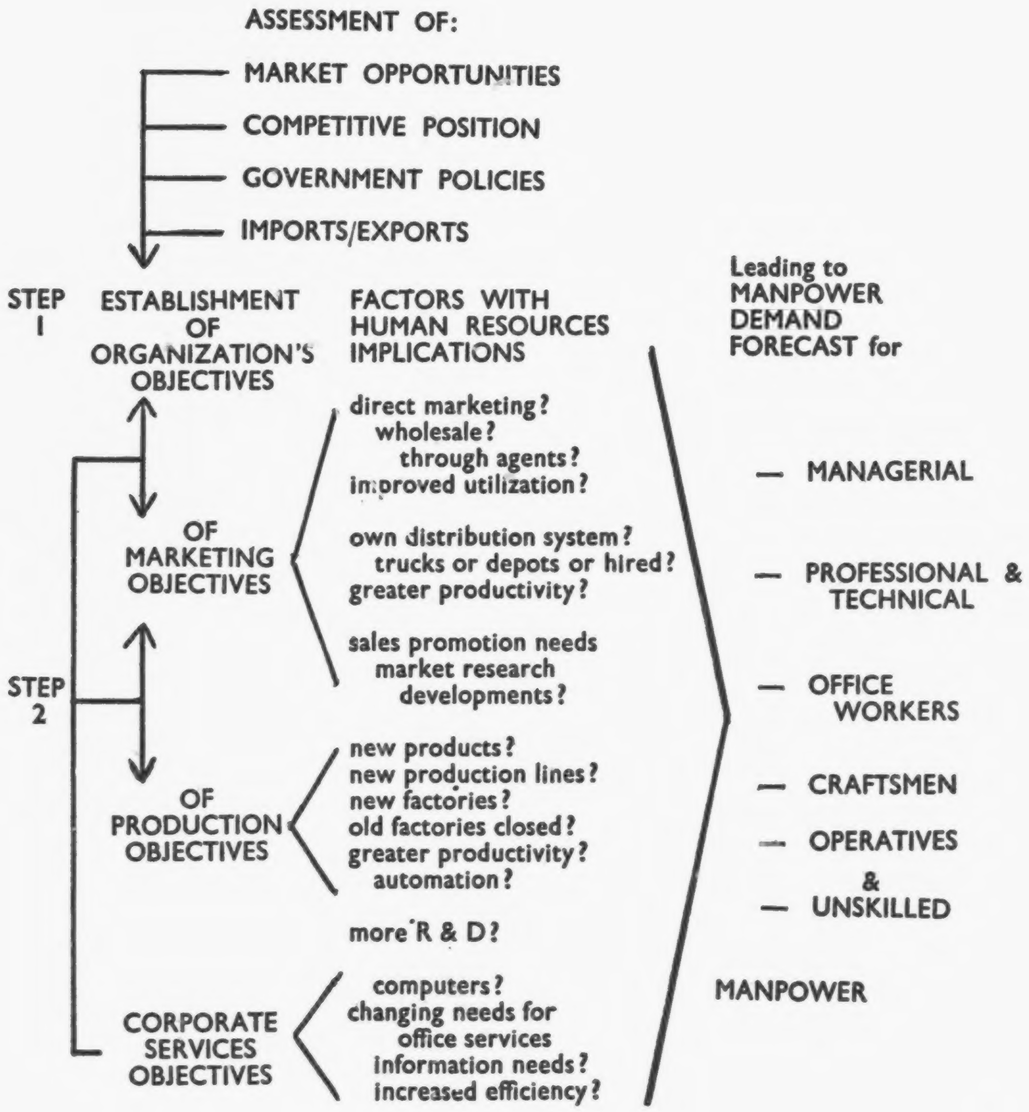
A further aspect of forecasting must become apparent. Global, generalized estimates of an organization's requirements will be unrewarding, although this is what many firms did for the National Plan enquiry in 1965. The manpower needs of each function must be considered separately, ie research, design and development, production, distribution, sales, accounting and other corporate services. When an organization is expanding, its functions are expanding at different rates. Output may be doubled; yet the sales force may be reduced because the pattern of marketing is changed. More emphasis could be placed on national advertising and merchandizing intensively through 200 key sites, compared with less effective but more expensive contact with 1,000 small country-wide outlets.

Each function needs to be examined in terms of employee category. The need for managerial, professional and high-level technical skills is likely to follow one path. As firms become larger and more complex, the decisions more important and yet more difficult to make, the numbers of people in service functions will inevitably increase. Market research, operational research, organization and methods, economics, budgetary control, management accounting and financial analysis functions which are today prevalent in the largest organizations will become more widely used. Management itself will alter as more useful information, digested and possibly interpreted by large computer systems, will be available to decision takers.

Office staff will be affected by other changes. Routine clerical functions will be superseded by computers, but the numbers of associated staff (programmers, operators, maintenance staff, and input/output data verifiers) will expand. Some copy and shorthand-typists will disappear and will be replaced by audio-typists operating from a central reservoir of office services. Computers could well store all correspondence, thus doing away with traditional filing centres. Indeed, internal business mail, and perhaps ultimately external mail too, will pass directly, under computer control, from a teleprinter in one office to the teleprinter in the office of the addressee.

Blue collar workers are likely to be affected by yet other factors. Factory

Forecasting manpower needs **Figure 4**


ASSESSMENT OF:
MARKET OPPORTUNITIES
COMPETITIVE POSITION
GOVERNMENT POLICIES
IMPORTS/EXPORTS
STEP 1
ESTABLISHMENT OF ORGANIZATION'S OBJECTIVES
FACTORS WITH HUMAN RESOURCES IMPLICATIONS
Leading to MANPOWER DEMAND FORECAST for
direct marketing?
wholesale?
through agents?
improved utilization?
OF MARKETING OBJECTIVES
own distribution system?
trucks or depots or hired?
greater productivity?
sales promotion needs
market research
developments?
STEP 2
— MANAGERIAL
— PROFESSIONAL & TECHNICAL
— OFFICE WORKERS
new products?
new production lines?
new factories?
old factories closed?
greater productivity?
automation?
OF PRODUCTION OBJECTIVES
— CRAFTSMEN
— OPERATIVES
&
— UNSKILLED
more R & D?
computers?
changing needs for
office services
information needs?
increased efficiency?
CORPORATE SERVICES OBJECTIVES
MANPOWER

automation will demand more skilled workers and fewer operatives. There will be pressures for shift work to increase. In the distributive trades, not only will the firm have an incentive to make more effective use of investment in physical resources, but also to free the roads during the day-time from the increasing density of commercial vehicles.

In general terms, too, it will be advisable to look at the manpower needs of individual plants. Output may be doubled at one modern plant with, perhaps, only a 25 per cent increase in labour. If output were to double at another site, producing the same product, because of the nature of production resources, perhaps a 60 per cent increase in manpower would be needed.

Therefore, the economic plans may have complex manpower implications which require careful analysis. The process is not one-way, for an assessment of the manpower implications could well result in modification to the economic plans. It is a continuous dialogue between various departments that is necessary. (Figure 4)

Finally, it is worthwhile differentiating *need* and *demand* for manpower at the level of the firm. Manpower needs are related directly to the organization's objectives: manpower demand is an interpretation of that need in terms of the resources that might be available. For example, a department of a company may have a need for ten technicians, but express a demand for only five because the departmental manager assumes that, with the pay he will offer, he will only be able to recruit five. Conversely, he could express a demand for 20, although there is a need for only ten, either because analysis of technician utilization has been absent or ineffective or perhaps through a tendency for empire building.

Forecasting supply

So far, consideration has been given to assessing the future demand for manpower of one kind or another: assessment of the supply situation demands a completely different line of enquiry. The future manpower supply may come from internal sources, ie from people who are already with the organization, or from external sources, ie from people who are recruited from the community's total manpower pool. The availability of manpower within the company in the future may be fairly predictable within limits: it is much less easy to forecast the quantity and quality of people in the labour market generally because of the general dearth of information.

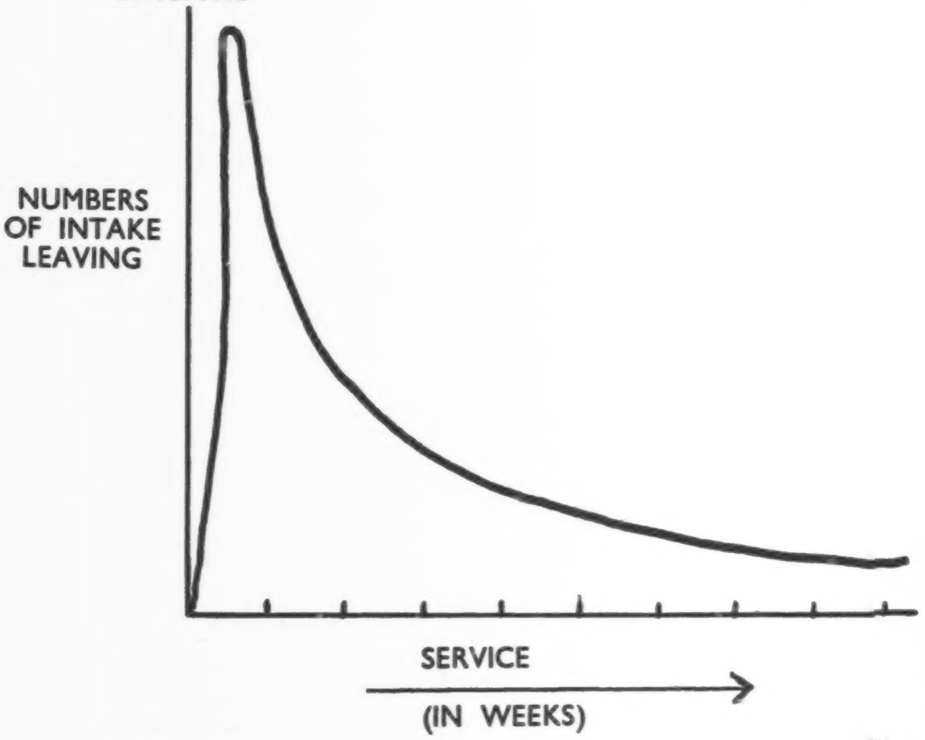
Internal sources

Analysis of the manpower supply situation in, say, five years time, begins with a comprehensive assessment of manpower within the organization, covering age, service and job field at the present time. The availability of a detailed manpower dossier of this kind is a necessary preliminary.

The further basic information required relates to turnover and the annual wastage rate which has a statistical probability of continuing into the future at a changed or at the same rate. A crude undifferentiated application of the

Figure 5

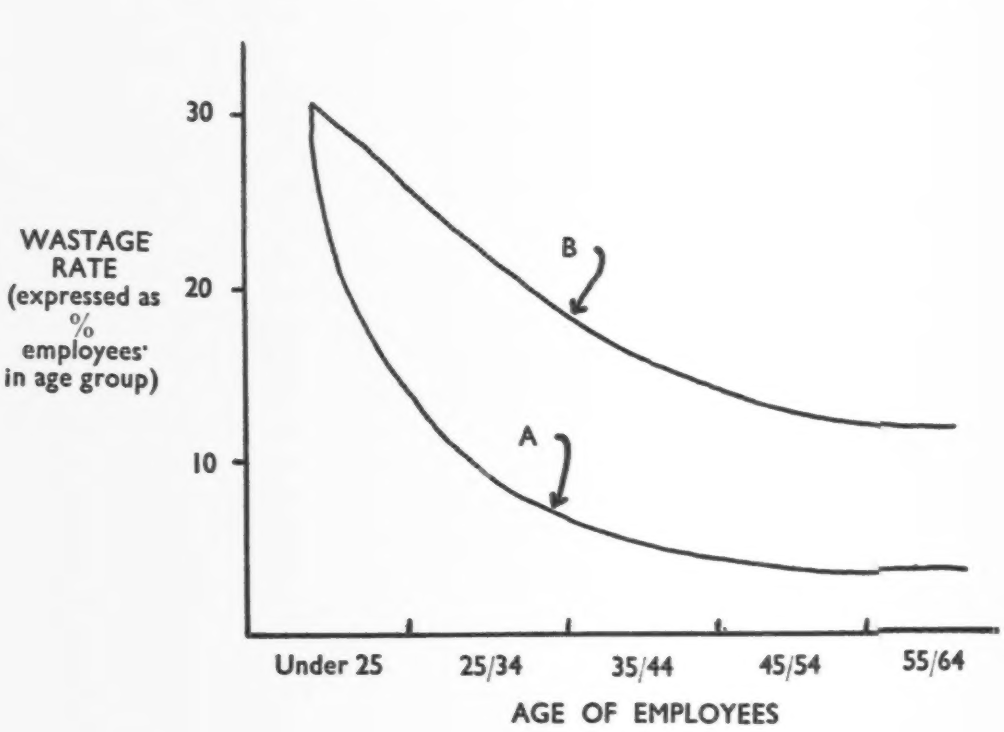
Wastage rate for group of employees, as a function of length of service



Wastage rate as a function of age

Figure 6

(A) under today's conditions
(B) predicted, when transferable pension schemes become videspread



wastage rate of 10 per cent per annum would mean that, of 5,000 employees in the company in 1967, 3,500 only would remain in 1970.

A differentiated approach to the problem would take into account the fact that, although the overall turnover may be 10 per cent in any organization, turnover is likely to be greater for women than for men, greater for the unskilled than the skilled, lower for R & D technologists than for salesmen, greater for the talented than the less talented and so on. Hence a differentiated approach would be to assess the forward internal supply situation for each sub-group before consolidating the total organization position.

A further and important sophistication is to take into account the age and length of service of employees when forecasting the future supply position. The overall wastage rate may be different from one company to another because of the difference in age structure and length of service patterns in the companies. Younger employees with short periods of service are more volatile as a group than older employees with short periods of service.

Eddison, Pennycuick and Rivett[5] show that studies of wastage amongst new entrants to an organization show that the wastage curve is of the type shown. (Figure 5). A large proportion of the group will leave early in service and the rate will slow down later. Thus if there is an increase in the intake, say, through a new production line, the total will probably increase sharply.

Turnover is also related to age. Younger employees, with no great investment in the company, will tend to show higher wastage rates than older employees whose stake in a pension plan is correspondingly greater. Wastage curves based on age will generally be of the same shape as those based on service. The shape of the curve could be significantly altered by the introduction of schemes for the greater transferability of vested pension rights. The present level of turnover of, say, 5 per cent among salaried staff in the 35–45 age range might rise to the more volatile rate of 15–20 per cent. (Figure 6).

Note: the wastage rate is defined as

$$\frac{L}{\frac{1}{2}(N_B + N_E)}$$

Where L = number of leavers
N_B = number of employees at beginning of year (or period)
N_E = number of employees at end of year (or period)

A projection of the structure of the labour force in five or ten years time can reveal critical areas for the manpower adviser. The charts below show that, based on consideration of age and service, the next ten years will see the retirement of a large number of personnel recruited immediately after the war. The recruitment in the 1945–50 period resulted in the top jobs being filled by men of roughly the same age. This adversely affected recruitment over the next ten years. Now there are not enough men with sufficient experience following behind this group to take over these positions. The same projection reveals that, if turnover continues at present levels, the number of the under

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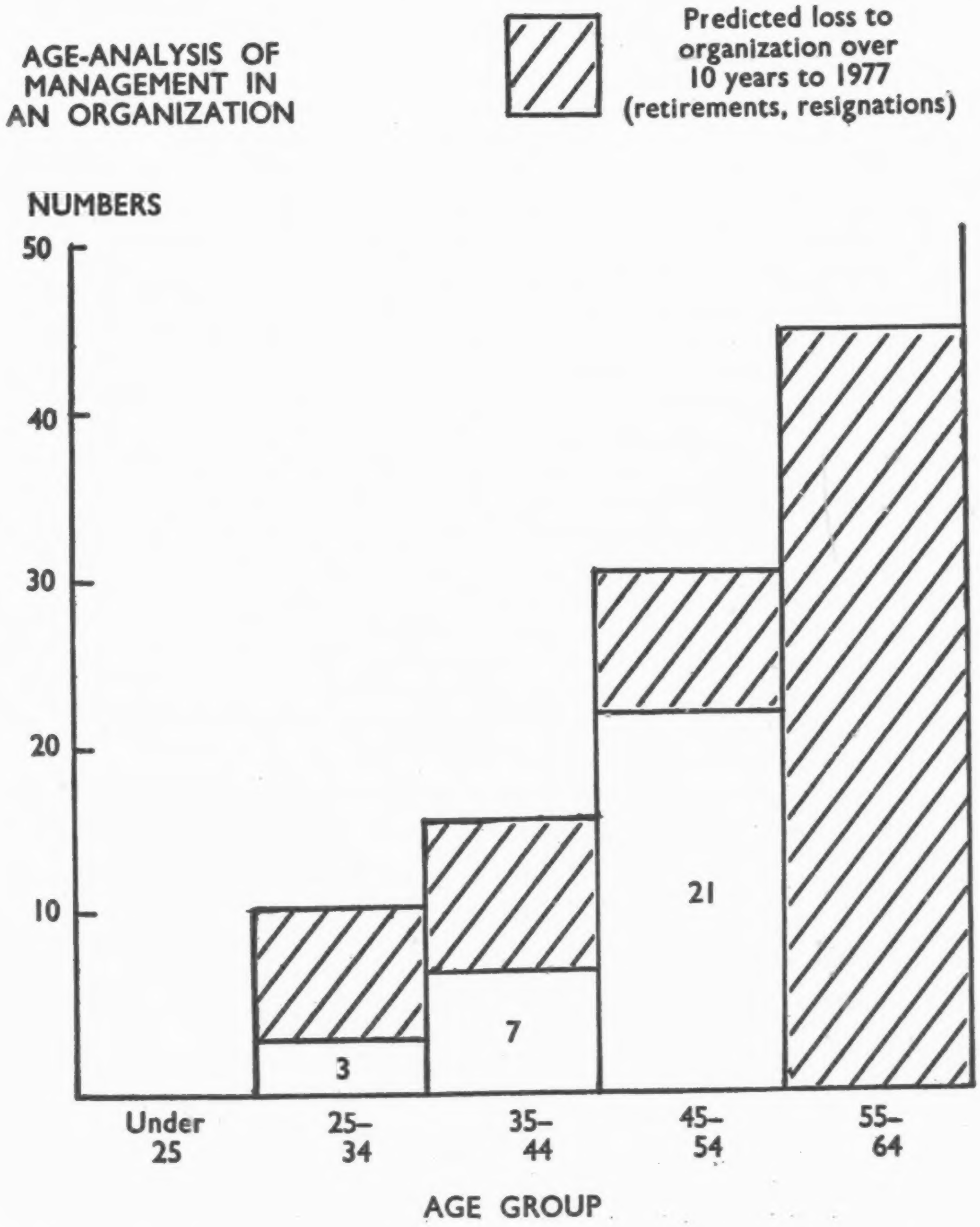
[5] *Operational Research in Management*, English Universities Press, 1962

Figure 7



Here, of 100 managers in 1967, only 31 will probably be working in the organization in 1977.

35s in one area of the organization's activities who will still be with the company in 1977 is only 30 per cent of those presently employed. (Figure 7).

Such projections may also indicate that natural wastage alone cannot be relied on to reduce the numbers in a function to levels considered to be necessary. This would have consequences for redundancy and redeployment policies.

Models

In larger organizations, or when dealing with larger numbers of personnel, it becomes cumbersome to carry out such forecasting 'by hand' and mathematical models may need to be invoked. Professor Andrew Young has written a number of papers on the application of mathematical techniques to manpower problems.[6] The earlier paper (1961) elaborated the basic mathematical techniques and their application to a large, anonymous organization with a number of staff grades. The object was to predict, on the basis of past information on the promotion of personnel at various stages of grade, service and age, the probable numbers of staff in various grades in the future. Such a technique is apposite to organizations with well-defined patterns of career structures, which also have retained historical records of staff movements and, in particular, the staff movements who have actually left the organization.

The later paper (1965) analysed the career structure of university teachers, another employment category with defined promotional levels (professor, reader, senior lecturer, lecturer, assistant lecturer) and with well-defined patterns of career development. From such an analysis one can anticipate the problems that will inevitably arise within the universities over the next five to ten years on the promotion prospects of the present lecturing staff whose numbers have been swollen as a consequence of university expansion in recent years.

Such models can, of course, be developed and made to predict the consequences of changed patterns of employment within the organization as a result of changing demands for labour. The operational research analyst, and the mathematical model builder, can be of considerable value in complex areas such as these. But models are *not* the reality; and the answers they give are no better than the assumptions fed into them. It is for this reason that, while they should be warmly welcomed, they should be used with caution and the findings interpreted with clinical care. It is the manpower adviser who builds the assumptions on wastage rates and the definition of occupational categories into the model and it is he who should ensure that the model carries out the operations most pertinent to the organization's problems.

External supply

Estimates are needed by the manpower analyst of the total size of the labour pool in the future, and in particular of the probable size of particular occupa-

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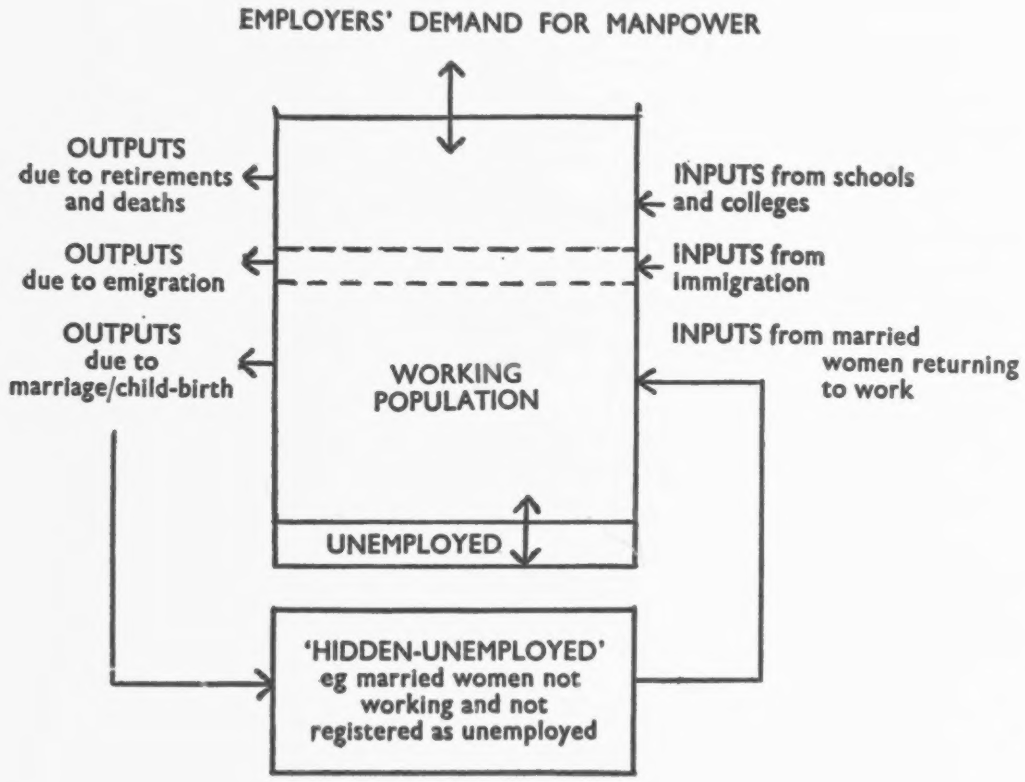
[6] Predicting Distributions of Staff (with Gwen Almond), *The Computer Journal*, 1961, pp 246–250. Models for Planning Recruitment and Promotion of Staff, *British Journal of Industrial Relations*, November 1965

Figure 8

The labour market
(at present and as forecast—by region or by occupational group)


EMPLOYERS' DEMAND FOR MANPOWER
OUTPUTS due to retirements and deaths
INPUTS from schools and colleges
OUTPUTS due to emigration
INPUTS from immigration
OUTPUTS due to marriage/child-birth
INPUTS from married women returning to work
WORKING POPULATION
UNEMPLOYED
'HIDDEN-UNEMPLOYED' eg married women not working and not registered as unemployed

tional groups. These estimates derive from predictions of the total population, and take into account the inputs from the educational system and the rates of immigration and emigration. The manpower adviser must also make a forecast of the share of this supply which his firm is likely to attract and this will allow for the demands of other employers and the unemployment level. (Figure 8).

However, other factors come into play. The size of the labour market is affected by the inclination of those who currently are not working and who are not registered as unemployed, for example, married women. A change of motivation amongst married women to work, rather than to be exclusively housewives, would significantly change the labour reserves of the country. The school leaving age will be raised to 16 in 1971–72, thereby eliminating the entry of 15 year olds into work and thus significantly affecting the work of apprentice training centres. The continued growth in availability of higher education must inevitably cut down the numbers in the labour force aged 17 to 21 in the future. There are, too, regional variations in manpower availability, because the patterns of employment are not uniform across the country.

Chapter 6—Manpower planning in the organization

The culmination of the processes previously described is the formulation of the manpower plan. Each step, that of collecting information, classifying it, analysing it, forecasting demand and the forecasting of internal and external supply has to be done first. (Figure 9).

Any plan implies action: it also implies objectives. Before the manpower plan is drawn up, the organization must have formally decided its goals. If there is no parallel statement of social, economic or organizational objectives to which the manpower data relates, the organization can have no meaningful manpower plan.

It is a lack of emphasis on the need for objectives that has led to confusion in widespread discussions on what 'manpower planning' is about. It is just this point that has led to a lack of precision in discussions on 'manpower planning' at the national level. A company may be able to specify its business objectives and so is able to formulate plans for plant, financial resources and manpower. It is not at all the same problem for a government to talk of 'purposive manpower planning' because it involves government in specifying objectives in fields in which the manpower will be applied. Indeed, it is considered that the use of the phrase 'manpower planning' at a national level serves no useful purpose, at least in this country.

Planning in the organization

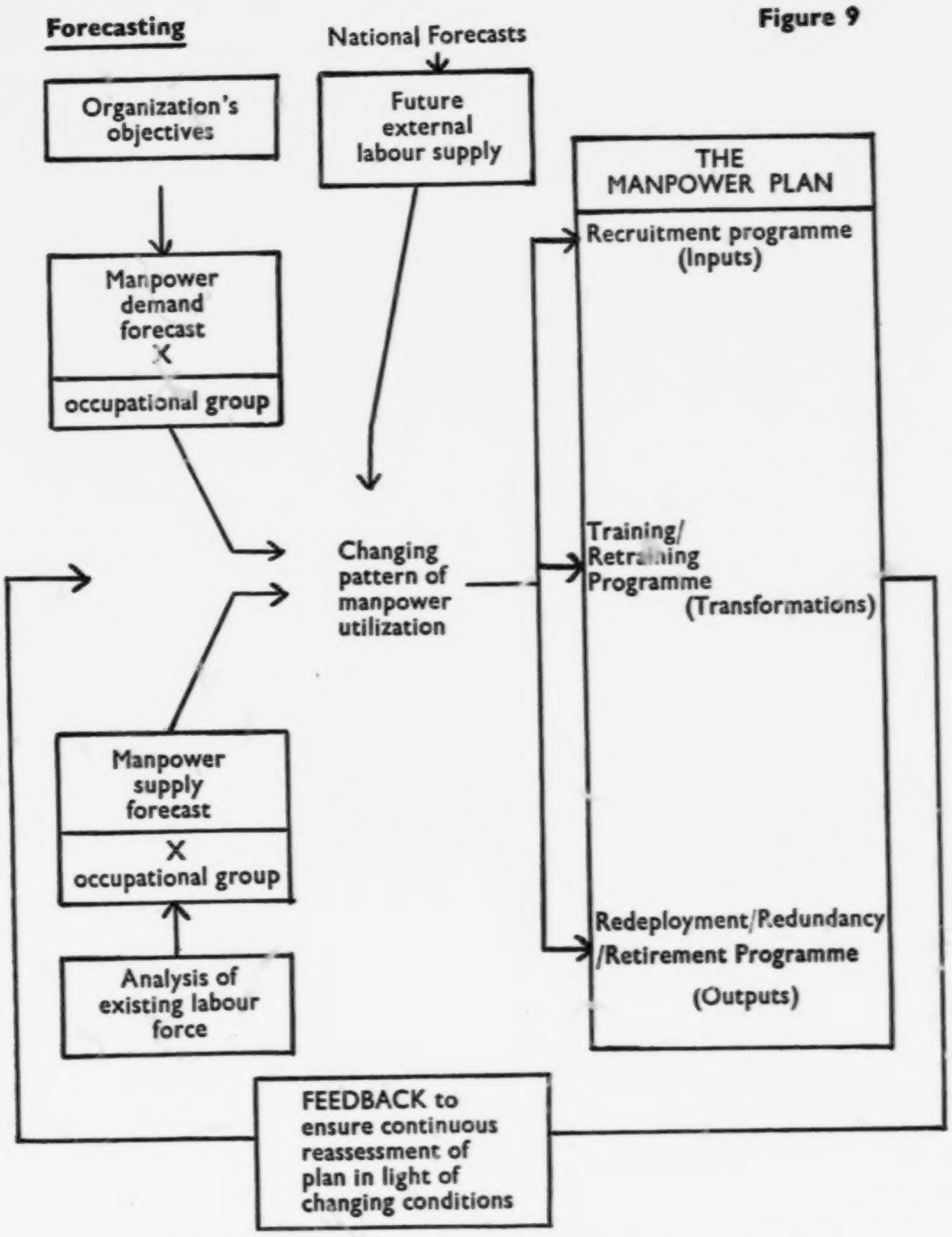
The plan, when drawn up, will call for activity in a number of areas; the diagram summarizes these inter-related activities. The forecasts of demand, and of internal and external supply, are fed in, each being edited by consideration of patterns of manpower utilization. From an analysis of these strands the manpower plan will be drawn up.

The overall plan will be a summation of plans drawn up to refer to particular manpower areas, possibly management, staff/services groups, office workers, distribution workers, production workers, and so on. Probably, because of the different time-scales involved, the management plan may relate to a period of five years, the office staff to two years ahead: there will not be one plan but several.

Action is implicit: each plan will demand recruitment, training and retraining programmes and, maybe, the redeployment of certain personnel to jobs outside the organization.

The first step must be to test the feasibility of the proposals. Suppose a company is planning to market its products direct through a chain of shops in the High Street, instead of selling through its own outlets, which are limited in number. The marketing director has decided that to achieve this he will need

Figure 9


Forecasting
National Forecasts
Organization's objectives
Future external labour supply
THE MANPOWER PLAN
Recruitment programme (Inputs)
Manpower demand forecast
X
occupational group
Training/ Retraining Programme (Transformations)
Changing pattern of manpower utilization
Manpower supply forecast
X
occupational group
Redeployment/Redundancy /Retirement Programme
(Outputs)
Analysis of existing labour force
FEEDBACK to ensure continuous reassessment of plan in light of changing conditions

Manpower forecast and manpower plan

to quadruple the size of his sales force in two years. This would be built into the first plan. But, after more detailed consideration of this proposal, the company sees more clearly that it could not reasonably expect to recruit so many sales representatives at the salaries and bonuses that are being proposed, nor indeed could the existing training system deal with such a sudden increase in the demand for its services. In the light of these circumstances, the marketing director may be forced to revise his original ideas.

A second example illustrates another aspect of the problem. The Secretary of State for Education is expecting to double the annual intake into teacher training colleges between 1965 and 1971. During this period, the number of 18 year olds in the population will drop by 25 per cent. It seems reasonable to suppose that, with universities expanding and employers still intent on recruiting school leavers into training or apprenticeships of various kinds, somebody's targets are not going to be met!

It is important to realize that the first draft of the plan may not be the final version. What is needed at all stages in the manpower planning process is feedback.

Feedback

Feedback into the various stages is essential at all times. The plan may have called for improved patterns of manpower utilization, but the associated redeployment terms may prove unacceptable even after the most exhaustive negotiations with the unions. There may be difficulties in providing the facilities for training or retraining personnel. and the problems of recruiting labour in a tight labour market may make parts or all of the manpower plan impossible of attainment. Only continuous feedback will ensure modification of requirements or sections of the overall plan in the light of foreseeable difficulties.

Feedback is particularly important today in the context of external recruitment. A company may simply be unable to recruit the types of labour decreed by the first edition of its manpower plan. It is very important that the implications of this as far back as the marketing or production plan itself are worked out. A company assuming it will be able to recruit the quality of sales staff it requires will plan a particular marketing strategy: if these prove unavailable it could be forced into abruptly changing its timing of the introduction of new product lines, revising its market share estimates, or putting the same sales through commission agents and so achieving lower profits.

The effect of feedback could be such that the entire pattern of work, and the organization's objectives, are reviewed again. An illustration of what could happen is seen with London Transport. The annual reports of London Transport highlight its labour supply problems. Wages and salaries make up 70 per cent of the undertaking's working expenses, yet they are insufficient to prevent the drift of drivers to better jobs driving commercial vehicles or working in the factories. The Board is short of some 4,000 drivers, and particularly short at depots in the west and north west of London. It also finds difficulty in recruiting conductors and the external supply situation is less favourable today, with fewer immigrants, than it has been in the past. If demand and supply cannot be reconciled, either demand must be reduced by curtailing services, or productivity significantly increased, for example, by more one-man buses. As foreseen at present such a radical departure from previous practice will not occur on the new double-decker buses with folding doors at the front, because, in the view of the Board, drivers would not be able to cope with the collection of fares in peak-hours. Yet the introduction of 'flat-rate' fares, at say 9d or 1s, could make this a practical proposition. The Board views this idea with scepticism maintaining that customers would be driven away.

Such changes in organizational practices are not willingly accepted, but somehow manpower resources and commercial objectives have to be brought into balance.

Reconciliation of objectives

Many companies will simply not agree they could have problems in recruiting and using their manpower resources. The attitude frequently is—'well, we have always managed in the past and so we shall manage in the future'. This confidence is being to some extent undermined by a shortage of craftsmen with certain skills, and especially with the excess of demand over supply of good quality computer personnel. But even in these cases it is the physical absence that is generally noted: what is often not sufficiently appreciated, because it is less easily quantified, is the differing contribution to the success of an enterprise of people with differing levels of ability.

As a company may come to accept that it will not be able to expand as quickly as it would wish, because it cannot get the capital it requires, so too may come a realization that it will not achieve its objectives because of shortage of the right calibre of manpower. This latter should cause a reappraisal of objectives which will not be easy to accept; a company will encounter resistance because of investment in managerial ego; the public services could encounter resistance because of the implications for a Minister's political reputation.

Fords of Dagenham

Peter Hodgson of Fords has given an instructive example of manpower planning over 12 months in the context of the firm.[1] The level of forward manpower demand at a plant is calculated by reference to production schedules and manning standards. Manpower availability is assessed in relation to the existing labour force, labour wastage, probable absenteeism, additional input from training schemes and changes resulting from manpower movements within the company through promotion or the completion of conversion training.

From such information it is possible to chart the probable labour balance over the months ahead and the example below clearly shows the areas which require action. (Figure 10).

The manpower forecast derived from production schedules is taken a stage further at Fords, into the planning stage. In order to predict the numbers

[1] *BACIE Journal*, December 1965

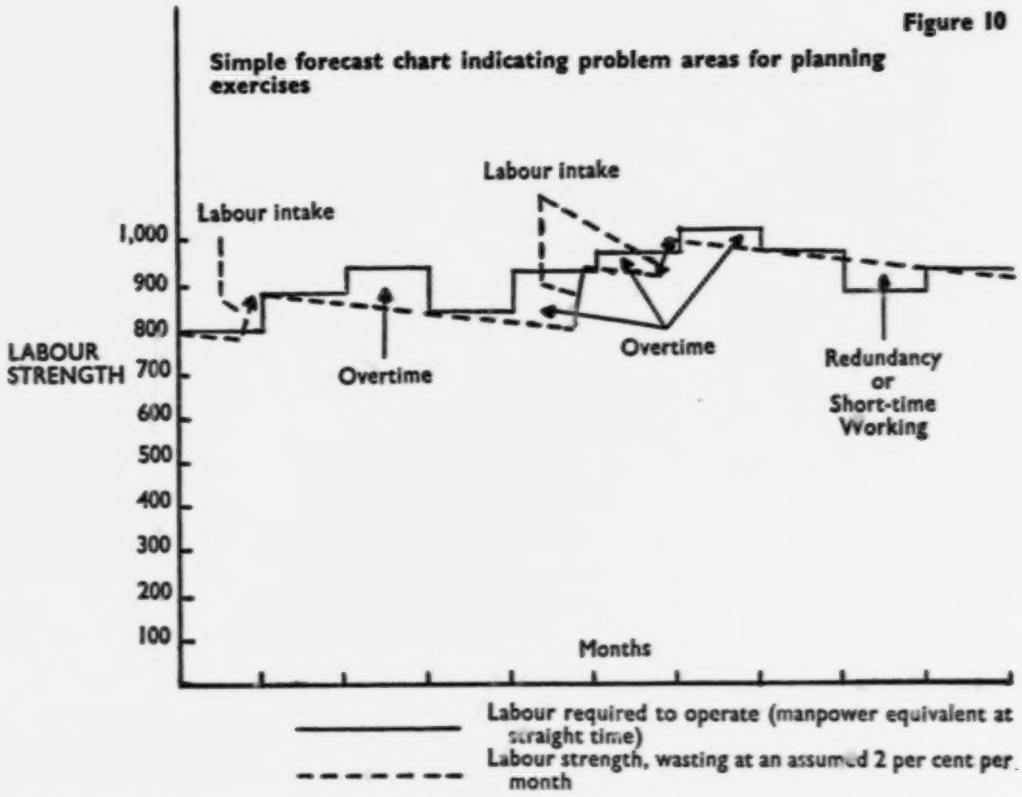


Figure 10

Simple forecast chart indicating problem areas for planning exercises

which can be recruited in any given month, past experience is used in order to quantify influences, such as the reluctance to change jobs before summer holidays and Christmas, and the lower requirements of the building industry in the winter. It is then possible to judge whether the recruitment required by the production schedule can be achieved or not. If it seems not, it may be necessary to amend the production schedule, probably by an earlier and more gradual increase in the number of cars produced. The plan thus feeds back into the forecast of manpower needs.

Manpower planning—training

A more detailed example can be given of the calculations made by an organization to estimate its apprentice intake and ensure their smooth absorption at the end of the training period.

Any expansion in requirements for craftsmen will probably take place more or less steadily throughout the year, whereas apprentices normally all finish at one time. Hence a conscious decision is required whether to carry a surplus for a time or make do with a deficiency until the new craftsmen are ready. However, a firm may tolerate unfilled vacancies from the beginning of the calendar year until July, when apprentices pass out, and then carry a surplus until the end of the year. In other words, the apprentices will fill craftsmen vacancies in the year during which they finish training.

Other solutions are, of course, possible. A surplus may be carried, gradually diminishing over a year, so that there is never a deficiency. Conversely, a deficiency may be carried for a year, gradually increasing until the output from the apprenticeship scheme makes up the numbers to what is really required. All this assumes a fairly steady, or steadily increasing, demand for craftsmen throughout the year. But this may not be so. There may be peaks in the need. It is when the demand for energy is low that the energy supplying industries can carry out their major maintenance work, so that they require maintenance craftsmen most in the summer. But the motor industry can re-arrange production lines when demand is low, in the winter, and thus the peak for its contractors' craftsmen will be in the winter.

The formula for determining apprentice intake is:

$$(b-a)+\left\{\frac{(a+b)}{2}\times\frac{c}{100}\right\}+\frac{x}{100}\left\{\frac{(a+b)}{2}\times\frac{d}{100}\right\}\times\frac{1}{\left(1-\frac{e}{100}\right)^{f}}$$

This assumes that unfilled vacancies are tolerated up to the time of completion of apprenticeships in July.

a = establishment for December of penultimate year of training (ie for year from January to that December)
b = establishment for December of last year of training
c = annual hardcore turnover (percentage figure) (ie deaths and retirements)
d = annual voluntary turnover (percentage figure) (including dismissals)
e = annual turnover of apprentices in training (percentage figure)
f = length of apprenticeship (in years)
x = proportion (as percentage) of voluntary turnover which it is decided to train. Most of those who leave voluntarily are not losses to their trade group and training replacements for them is not necessary.

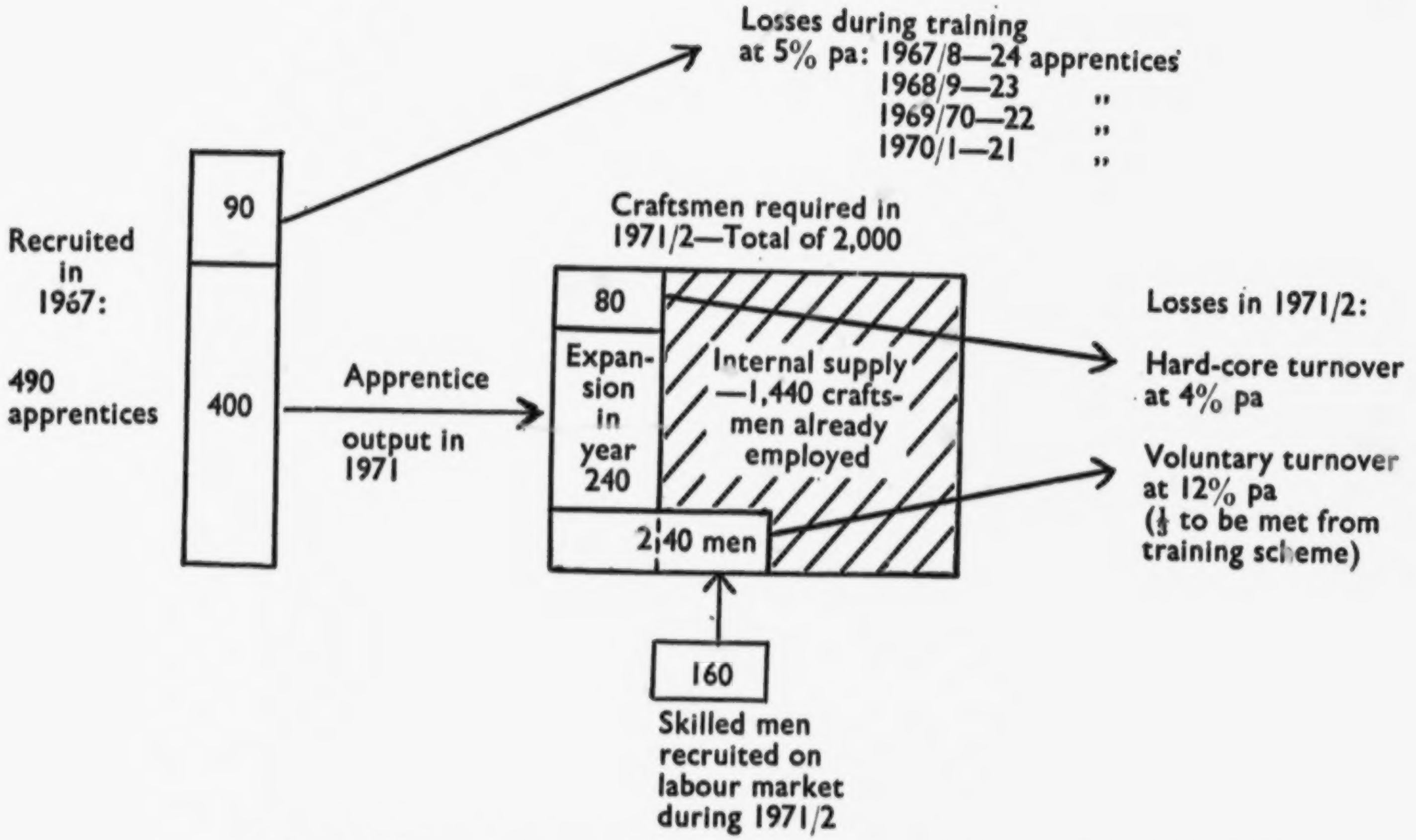
The formula is merely a summation of needs for craftsmen: expansion + hardcore turnover + a proportion of voluntary turnover. The final term is a correction for losses in training, that is, it converts the output required from the training scheme to the input needed to give this output. If apprentices leave at the rate of 5 per cent, after four years of apprenticeship an intake of 100 apprentices will be depleted by about 18. Thus an intake of 100 is fine if requirements of craftsmen are 82. If requirements were 100, the intake would have to be 123. The accompanying figure illustrates this calculation in graphical form. (Figure 11).

The logical difficulty is apparent. A firm may not be able to anticipate its production plan four to five years ahead. Yet the present apprenticeship prescription assumes that the manpower needs of five years ahead can be anticipated.

Two examples have been given to illustrate the principles outlined earlier. Others could have been quoted, but none would have been appropriate for all organizations; each organization has its own particular problems.

The point is that manpower is one—and the most important—of a number

Figure 11


Losses during training
at 5% pa: 1967/8—24 apprentices
1968/9—23 ,,
1969/70—22 ,,
1970/1—21 ,,
Recruited in 1967:
490 apprentices
90
400
Apprentice
output in 1971
Craftsmen required in 1971/2—Total of 2,000
80
Expansion in year 240
Internal supply —1,440 craftsmen already employed
240 men
160
Skilled men recruited on labour market during 1971/2
Losses in 1971/2:
Hard-core turnover at 4% pa
Voluntary turnover at 12% pa
(⅓ to be met from training scheme)

(Revised figure) Fig. 8—Pattern of Apprentice Recruitment: Recruitment of 490 is required in 1967 to supply the requirements of 1971/2.

of resources. As the building and the use of factories and equipment is capable of rational objective planning, manpower, too, needs to be examined with a similar degree of objectivity. It is difficult to do this, not only because the problems are immensely more complicated but because there is a widely-felt and emotional reluctance to study human resources in this way. The time should have passed when such attitudes were too prevalent. There are cogent reasons for an organization dispassionately assessing its use of manpower and deciding what could be done to increase the satisfactoriness of an employee's performance, as the employer sees it, and simultaneously to increase the job satisfaction from the employee's viewpoint.

Chapter 7—Manpower and government

The needs of firms for information

It has already been argued that an organization needs to be constantly aware of the demand and supply for particular occupational groups in the population as a whole. This is essential if the manpower adviser is to put his forecast of the labour requirements of his own organization in the correct perspective.

The first forecast might be that the firm would like a further 50 mechanical engineers over the next two years: an examination of national statistics on the supply situation will indicate how realistic this is. A company moving to a development area needs to know about the labour supply for particular skills; the types of craft skill needed by the company may not be found among the population of the area.

A company needs to know the nature of future demand for a particular occupational category by the industry and the region. To what extent is the company likely to be seeking labour in an extremely competitive market? Brian Murphy's predictions of computer personnel requirements (see p 21), seem to indicate that the demand will be very high, right into the 1970s. This will continue to have an inflationary effect on salaries if a share of the best computer people is to be retained. This shortage will probably stimulate the formulation of ready-made and packaged computer systems for standard individual applications to avoid using scarce systems programmer resources on commonly encountered problems.

The availability of national manpower information on a regular basis would enable forecasts of demand and supply for the organization to be better evaluated. Information on the likely shortage of semi-skilled operatives could indicate the need to accelerate the introduction of automated equipment into a factory; the absence of particular skills in a development area would indicate the need for substantial retraining programmes. Thus on the next occasion that the organization submits its own forecasts of demand for national collation, it will already have taken into account the national data available on supply and demand. In this way a continuously updated estimate of supply and demand for manpower can be made.

Available statistics

The United Kingdom manpower statistics are amongst the best in the world, second only to those of the United States and possibly Canada[1], but there are a number of serious deficiencies in the statistics which are available and there are certain statistics which are not available at all.

[1] **Essential Statistics for Manpower Forecasting, J R Crossley, in *Manpower Policy and Employment Trends, edited* by B C Roberts and J H Smith, published by Bell for the London School of Economics, 1966**

The use of the basic category of 'insured employees' means that all self-employed workers are omitted. Non-manufacturing industry also receives far less attention than manufacturing: certain statistics are collected only for manufacturing industry: the annual survey of occupational structure, monthly numbers employed, overtime and short-time, labour turnover and part-time employment of married women.

The entire area of definition of occupational titles is unsatisfactory. There are three different systems of occupational titles used by the Ministry of Labour itself. The international standard, ISCO[2], published by the International Labour Organization, is widely used but suffers from a basic defect in that, in the higher occupational levels, the description of the occupation is associated with particular levels of educational or professional qualifications: the point is that too much is conventionally assumed already about the education appropriate to a particular occupation, so that to define one in terms of the other reduces the opportunity to see how occupation and education are really related. More fundamentally, one can question the meaningfulness of job titles anyway: what is really important is the function employees perform, which may be obscured rather than clarified by the occupational labels worn. Another difficulty is that relevant statistics are collected by several government bodies and published in several government publications. For example, the division of statistics varies, being for England and Wales, Great Britain and the United Kingdom in different cases: this leads to confusion and makes comparisons difficult.

Most national statistics are collected by the Ministry of Labour but other bodies are involved. The Ministry of Public Building and Works collects figures on construction workers, although the production of statistics on earnings and hours in construction is the responsibility of the Ministry of Labour. The Ministry of Agriculture deals with agricultural workers. Manpower figures incorporated in the Census of Production are dealt with jointly by the Board of Trade and Ministry of Power. The Committee on Manpower Resources for Science and Technology, although the responsibility of the Ministry of Technology, has its figures for the Triennial Survey of Engineers, Technologists, Scientists and Technical Supporting Staff gathered by the Ministry of Labour.

Figures on the overall future supply are also a divided responsibility. Forecasts of the working population are provided, albeit irregularly, by the Ministry of Labour. Education statistics for schools and colleges are given annually by the Department of Education and Science, with further details on degree courses from the Council for National Academic Awards, but university figures are provided by the Universities Central Council on Admissions (entrance to universities only) and the University Grants Committee. Analyses of certain shortages have been done by the Department of Economic Affairs. Finally, *ad hoc* enquiries collected with governmental backing are not channelled, as one might expect, through the Ministry of Labour. A good example of this is a recent enquiry from the Fulton Committee on the Civil

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[2] International Standard Classification of Occupations

Service on age and mobility of employment, which must have cost each firm to which it was sent comparatively large sums to complete, which was largely useless to the firm itself and not obviously of great use to the Committee, and which seemed to the recipients to duplicate in part a previous Ministry of Labour enquiry.

This divided responsibility leads to scattered publication. Most statistics appear in the *Ministry of Labour Gazette,* and some are summarized in the *Monthly Abstract of Statistics.* Forecasts of the total population appear regularly in the latter, whilst forecasts of the working population appear irregularly in the former. The quarterly figures of agricultural workers are in the *Agricultural Statistics, England and Wales* and the construction workers in the *Bulletin of Construction Statistics.* Other figures appear in the *Board of Trade Journal.* Educational statistics are in *Statistics of Education,* published annually, and the other figures which have been mentioned are provided in separate reports: the Committee on Manpower Resources for Science and Technology, the University Central Council for Admissions, the Council for National Academic Awards, the University Grants Committee and the Census of Production Reports.

There have in addition been the reports of the Manpower Research Unit of the Ministry of Labour on certain industries, which have themselves recognized the inadequacy of available statistics.[3]

Two final criticisms can be made. Analyses of the occupational structure of the work force are lacking, apart from the census figures which are less reliable because they result from self-classification. Statistics are sometimes published too long after the event to be of full use; for example, the *Census of Production* for 1964 had not been published at the end of 1966 and only provisional figures of the more comprehensive census of 1963 were available.

Analysis of the 1961 *Census of Population* was not complete until 1966, when the 10 per cent sample survey was carried out.

Forecasting supply

Of the statistics already discussed only a handful are predictive. Forecasts of population exist already and those of the working population derived from them need extending and putting on a regular basis. The educational supply statistics, however, are not predictive; those who want to analyse trends must do it for themselves and those who want to know the facts on overall provision of education in the future must glean them from government announcements.

However, the supply side of the Government's role in manpower forecasting is comparatively easy. The additions to the working population for the next 15 years are already born and death and retirement rates can be forecast with some certainty. The effects on the population of immigration and emigration are, however, uncertain. Whilst both are partially dependent on Government policy, other factors, such as the comparative prosperity of this country and the migration policies of other governments, are also relevant. The size of the working population is affected by 'participation' (or 'activity') rates which, in particular, mean the proportion of employment among such critical groups as married women, retired persons and the students. The assumptions to be made are well set out in Appendix 1 of *The Pattern of the Future*.[4]

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[3] Manpower Studies No 3, *The Construction Industry,* HMSO, 1965

Forecasts of the output need to be modified to take account of intended changes in educational provision, which ought to reflect the projected requirements.

Forecasting demand

There are no regular demand statistics at all. The Manpower Research Unit Reports have shown what can be done, but these partial reports need integrating into a whole, which is constantly checked and up-dated. Certain occupations cut across industries, as the MRU Report on *Computers in Offices*[5] recognized, but so do some of the occupations covered in the *Metal Industries* and *Construction Industry* reports.[6]

There have been only two attempts of importance to forecast demand for manpower in Britain: the National Plan and *The Pattern of the Future*. The National Plan made its forecasts mainly by enquiry—by asking industry the numbers which they expected that they would require. *The Pattern of the Future* was based on extrapolation of trends.

The enquiry method would be much easier to use if firms were used to forecasting and planning manpower. In preparing the National Plan, the forecasts made had to be discussed and modified to add up to a sensible whole and probably this would always be necessary. Nevertheless, many changes in manpower use depend on industrial decisions and facts about these are important. Such enquiries should be conducted alongside projections, so that discrepancies can be enquired into.

Extrapolation can be done in two ways. One can extrapolate the manpower requirements themselves or extrapolate something on which manpower depends, such as production and productivity. The first method may be termed 'naïve' and the second 'differentiated'.

An outline of methods of national manpower forecasting is provided in *Employment Forecasting*.[7] In this publication Professor P de Wolff, Director of the Netherlands Central Planning Bureau, discusses the computable model used by him which consists of 36 equations describing the most important relationships governing the Dutch economy. The application of a British variant of this sort of econometric model is currently being investigated at Cambridge in the Department of Applied Economics.

The contribution from Sweden in the OECD[8] publication shows a simpler approach to demand forecasting. The Swedish forecasts are 'naïve' extrapolations of current trends but they are produced by individual sectors of industry and are modified by intuitive means according to likely future changes in employment. This paper emphasizes that the forecaster must allow for increased productivity, unless this is thought to be changing at the same rate as in the past and thus built into the extrapolation.

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[4] Manpower Studies No 1, HMSO, 1964

[5] Manpower Studies No 4, HMSO, 1965

[6] Manpower Studies Nos 2 and 3, HMSO, both 1965

[7] OECD, 1962

[8] Organisation for Economic Co-operation and Development

Sweden also carries out occupational forecasts, an area hardly explored in Britain. Sweden, like Britain, lacks historical information, but attempts are being made to get the most from records available, so that an occupation/industry 'grid' can be produced. An interesting comment is made on the question of occupational supply: that occupational supply is only semi-autonomous. This means that, although supply can be influenced by providing suitable education and by the availability of jobs, it is also influenced by social aspirations and prejudices. This is illustrated in this country by the problem of the supply of professional engineers. The more irrational prejudices can perhaps be modified through the provision of vocational guidance and occupational information, but the existence of social pressures of this kind must be reckoned with.

Since a major aim of Swedish forecasting is to plan education, their next step is to turn the occupational forecast into a table of educational requirements. This demands a standard educational classification. The forecast then takes on proportions which require sophisticated data processing, since there are about 4·5 million combinations (50 sectors, 300 occupations, 300 education groups). A problem here is substitution, the ability of some jobs to be filled by people of different educations. Usually current proportions are carried forward, but intuitive modifications may have to be made.

In all this section, the word 'demand' has been used; but the important distinction between demand and need has been stressed earlier. Total demand is not necessarily equivalent to national need.

This then is another intuitive modification which has to be made to the forecast to ensure that needs will be met. Since employers are apparently prepared to keep in step with educational changes, the Government can affect the demand by making its educational plan reflect its forecast of the need. All the methods outlined are basically extrapolation of the past. Even the enquiry method depends on firms' extrapolations. "Even the very basic assumption that there will be a future rests on sheer extrapolation; so far there has always been a future . . . and so we conclude that there will be more of it".[9]

But it is imperative to emphasize that no forecasts of future needs can be reliable until there is available a far clearer understanding than we have at present of the impact of productivity increases and more efficient patterns of manpower utilization on future labour requirements. A great deal of empirical research in organizations is urgently needed: a negligible amount has been done. Without a thorough understanding of manpower utilization, there can be no meaningful forecasts.

[9] Sten-Olof Döös in *Employment Forecasting, OECD,* 1962

National Manpower Commission

The present unhappy and disorganized state of occupational statistics in this country should not be allowed to continue. It is time, too, that the excellent studies of manpower needs for science and technology were complemented by studies in depth of manpower needs in other areas of demand. An overall sense of urgency is lacking, both in undertaking wider fundamental studies to gain a better appreciation of manpower problems, and in producing a coherent framework to link the work currently being done.

At present, the manpower resources for manpower studies are scattered through many government departments, and through other interested institutions such as universities. In addition, many firms are undertaking manpower studies, and spending a great deal of time in overcoming communication barriers.

It is proposed that a National Manpower Commission be set up with specific responsibilities in this field. This would be a statutory body with a chairman and staff who were not members of the Civil Service, although they might be drawn or seconded from the Civil Service as well as industry and the universities.

The Commission would undertake all forecasts of national manpower needs and supply and would co-ordinate all statistics on manpower. Clearly there would be opportunities for government departments to carry out additional studies, for example, the Ministry of Health on emigrant doctors, but there would be statutory requirements that the Commission be informed of all such supplementary studies proposed and planned.

A further requirement would be that the Commission would produce an Annual Manpower Review, a comprehensive document detailing forecasts of manpower demand, manpower supply, industrial training requirements, and the changing patterns of manpower utilization resulting from improvements in productivity on a regional and national basis. This would be laid before Parliament.

It is envisaged that the National Manpower Commission, if it was directed effectively and served by professional manpower advisers and had the full confidence of the Government, industry and universities, would make a unique contribution to the understanding of our national manpower problems.

A limited precedent has been set for this approach to the use of the nation's manpower recources. In the USA under the Manpower Development and Training Act of 1962, an annual Manpower Report to the President is made. He is also advised by a standing Committee on Manpower.

The Commission would have to work closely with the National Economic Development Council. In the USA, there is also an annual Economic Report to the President and R A Lester has commented on the need to co-ordinate this with the Manpower Report.[10] Michael Hall has drawn attention to the dichotomy in Britain between manpower and economic questions which exist in government and industry.[11] This must be remedied for it is important for the manpower forecaster to have a clear idea of government economic plans. Thus it is vital that there should be a regular economic report and forecast: one of the shortcomings of the concept of the National Plan was that there was no provision for regular revision. It is envisaged that, with the present government structure, the National Manpower Commission would work closely with the Department of Economic Affairs.

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[10] *Manpower Planning in a Free Society*, R A Lester, Princeton University Press, 1966

[11] Productive Manpower Planning, *New Society*, 21 July 1966

Financed partly by government grant, but supported substantially by industrial subscriptions to ensure it provides a useful service to industry, it would provide an informed basis for all discussions by industrialists, economists and sociologists on the nation's manpower. The need for more, and better, forecasts has been emphasized by the Estimates Committee[12] although it recommends that such work be done by the Manpower Research Unit of the Ministry of Labour, for whom an important, new and different function is foreseen here.

Government as employer

So far, the role of government has been considered in relation to other organizations, in providing the necessary general information for individual companies to carry out effective manpower studies for themselves. But government has another interest in manpower problems—in its role as an employer.

Government departments should carry out the kind of analysis described earlier—forecasting demand, forecasting supply, studying manpower utilization and drawing up plans to ensure that its recruits are trained systematically and that the skilled manpower required will be available. At present this is inadequately done by Governments, which nevertheless exhort private industry to perform these functions. What is needed is a systematic study of the manpower resources and needs of all departments of local government, of the armed services, of education and of government research establishments. Some work is being done by most of these but, so far as the general situation can be assessed, the kinds of studies described in this pamphlet have generally not been carried out. There does not appear to have been an analysis of the objectives of individual units or of the relationship of these objectives to manpower resources available now and in the future. A co-ordinated approach to the manpower responsibilities is as essential for government as for any other employer.

The proposed National Manpower Commission would take over the existing general responsibilities of the Manpower Research Unit which would then be developed into providing for government and the public services the kind of manpower advice that should be available in every organization. The unit would carry out the estimates of future demand for government employees, study manpower utilization and advise on training and the planning of career patterns. It would here assume some responsibilities of the Treasury.

A re-assessment of the entire manpower structure of government services is long overdue. Whether or not the Unit, with newly defined functions, should remain within the Ministry of Labour is not very important. What is vital is that government, as an employer, should have such a manpower forecasting and planning group for its own employees.

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[12] Ninth Report, *Manpower Training for Industry*, HMSO, July 1967

'Manpower planning' at the national level

The term 'manpower planning' has been much used recently without any very clear conception of what it means. The distinction between the forecasting phase and the planning phase has already been made and it was shown that the planning phase implies both direction towards a stated objective and action in order to achieve it. The definition of objectives and the degree to which the action needed to achieve them is to be enforced is an area for political decision. Whatever the political decision is, there can be no reasonable objection to the Government asking for forecasts on manpower demand and it has already been argued that this is necessary if rational manpower decisions are to be made within an organization. There is such a complete lack of information on manpower forecasts of demand and supply in this country that to talk of manpower planning, at a national level, in whatever form it might be practised, is simply not feasible today.

There are, however, areas in which the Government can and should take action so that better use can be made of the resource of manpower. A report of the Irish National Industrial Economic Council[13] defined four basic areas of planning: employment forecasts, improved employment service, retraining and location of industry. The employment forecasts are a necessary preliminary to a really successful employment service. The service, equipped with such forecasts, would be able to give guidance not only in accordance with the capabilities of the people concerned (vocational guidance) but also with the opportunities likely to be available in the future (occupational guidance). In the USA, counselling already takes up about 6 to 12 per cent of the time of employment service officers. In Britain, a start has been made by setting up experimental occupational guidance centres in 11 cities, a step which was hailed as revolutionary by the *Observer*.[14] But they tend to deal only with people referred by the ordinary staff of the Employment Exchange and insufficient publicity has been given to them even in their own areas. This service needs rapid expansion and improvement, so that it is available to all who require guidance, employed and unemployed, in all areas. For real success, forecasts of manpower demand in the area must be available.

The ordinary employment service also needs improving. At present the proportion of jobs filled through the Employment Exchange is very small. The problem is a vicious circle: jobs are not notified to the Exchange because it rarely has suitable labour and it has no suitable labour because it is not notified of jobs. The compulsory notification of vacancies would be an authoritarian and impractical solution. Even without compulsory notification, the Swedish Royal Labour Market Board achieves some control through its supervision of private agencies; in Germany, the Federal Institute of Labour Placement is the only body permitted to refer workers for interview, filling 50 per cent of all jobs. In both countries an important part of the service is the provision of details of vacancies nationally in the form of a paper. Such lists enable people to consider moving from one area to another in the light of facts. Without this service in the USA, it has been shown that labour mobility is haphazard, with almost as many people moving into depressed areas as move out of them.[15] Unless there is a knowledge of the market, market forces cannot begin to act.

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[13] NIEC Report on Manpower, Stationery Office, Dublin, 1964

[14] *Observer*, 6 February, 1966

Even when a comprehensive information system is available, labour supply and demand may not get into equilibrium. Aids to encourage greater mobility of labour may therefore be needed in the future.

Finally, once the National Manpower Commission is providing comprehensive forecasts of supply and demand, the employment service should be extended to advising employers as they make their manpower plans, so that as far as possible they suit their demand to the supply which will probably be available.

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[15] *Manpower Report to the President,* US Government Printing Office, 1965

Chapter 8—Manpower and training

The thread of argument running throughout this pamphlet is that manpower should be treated as a resource and integrated into the firm's overall planning activity. Both themes have been developed in previous chapters. Training has a particularly important place in a consideration of this basic two-fold argument.

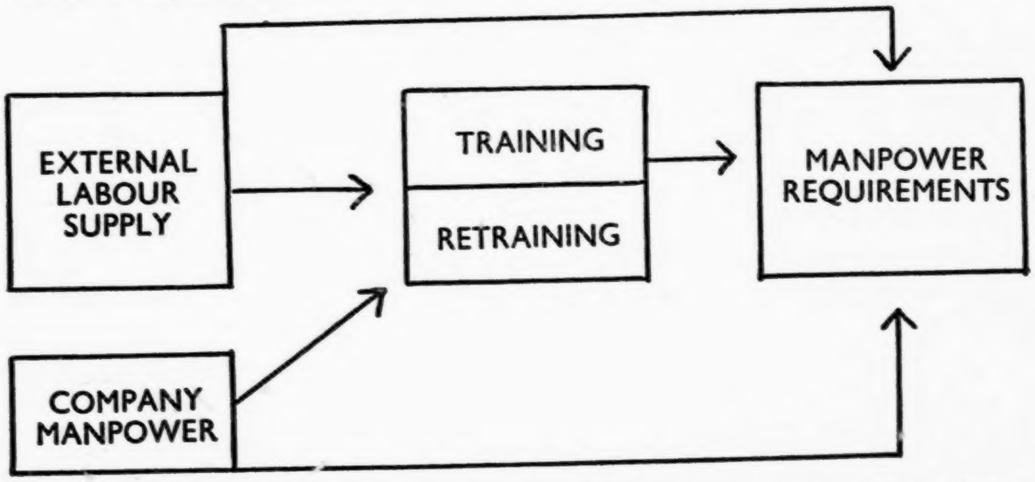
In simple terms the reasons for the importance of training in this context are:

(i) training is the major process by which the composition of a labour-force may be altered;
(ii) training is expensive;
(iii) there is evidence that not enough training is being done;
(iv) in any case, decisions of *some* kind have to be made about the amount of training.

It should be stressed that training in the present chapter is being examined primarily from the viewpoint of quantity rather than quality, as this is the more significant aspect from the manpower planning viewpoint: the most important point about the present apparent shortage of skilled craftsmen is the fact that there *is* a shortage, not that the ones available have been poorly trained.

Training as a process of adjustment

Training is the main intermediary between the number of jobs available and the number of people available to fill them. Within the firm this can be visualized in the form of the following diagram: in national terms the diagram would be very similar.



As a process of adjustment, training can clearly play a large part in realizing the objective of manpower planning: if the manpower situation within the firm or nationally is not what is desired, attempts should be made to improve it. Training is, of course, only one method among many others, such as improved utilization and redundancy, which have been considered earlier.

Training is expensive

In line with the concept of manpower as a resource, any process in connexion with it which is expensive should be given close attention. One of the immediate benefits of the Industrial Training Act has been to increase general awareness of the high cost of training. For example, the cost of a craft apprentice, even including little more than salary and direct teaching costs, may be at least £2,500. The charge made for 'industrial' training given in a technical college is 6s per student per hour.[1] The direct cost—fees and accommodation—of an external management course may be several hundred pounds for a relatively short course: the London Business School 12 week course, for example, costs £650.

Whilst such figures give some indication of the cost of training, it is difficult at present to scrutinize the variations in costs between firms and between types of training. Whilst BACIE has produced a clear guide to costing training,[2] few firms have made public the resulting calculations of costs. Such useful information as the variations in cost according to size of training scheme and nature of syllabus is thus difficult to obtain, and the small amount of evidence now available suggests that economies of scale are considerable for off-the-job training centres.

This scarcity of information, coupled with the small amount of expertise in assessing training effectiveness and the 'pay-off' of training, makes it difficult to ascertain that money spent on training is giving a good return.

Insufficient training

Accumulated evidence suggests that training effort in the past has been inadequate. It may be, as has been argued in Chapter 4, that the shortage arises from under-utilization of the existing labour force, but it is nevertheless an inescapable conclusion that the trained manpower available falls far short, in terms of quantity, of industry's demand—especially at the level of the skilled craftsman. Reference has been made to this point in earlier chapters and the following quotations show that the problem is a chronic one:

> "Signs are not wanting that the present intake into craft apprenticeship is inadequate. The number of vacancies for skilled occupations notified to Employment Exchanges has for many years past greatly exceeded the number of men in these occupations who are unemployed".[3]
>
> "On this evidence there is no doubt that the number of skilled workers—and so of craft apprentices—required in future will increase".[3]

It has been suggested that the shortage of skilled workers has placed restrictions on the rate of growth of the economy. The lesson here for firms, training boards and government is clear: whilst some attempts to grapple with the problem have now begun, the extent to which the attempts are adequate are open to question.

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[1] Department of Education and Science, Memorandum 9/66

[2] *A Standard Method of Costing the Training of Apprentices*, BACIE, March 1965

[3] *Training for Skill*, Carr Committee Report, HMSO, 1958

Decisions about training

Many entry-training schemes—apprenticeships, training for the professions—last for a number of years, and a decision about how many to recruit may have to be taken five or more years before trainees finally complete training. In the case of developing managers who will control a company's destiny in 20 years' time, the decision is made even further ahead of the event. If there is no other reason for manpower planning activity, there is at least a need for some assistance in making the decision about how many apprentices to recruit, or how many managers to develop. The assistance might be in general terms, the answers to such questions as:

> "Will the company continue to expand?"
>
> "How far ahead will automatic plant be installed, and what effect will it have on the types of labour we use?
>
> "As the company aims to diversify its activities, what sort of managers and how many of them will be needed in ten years' time?

Even at this level there will be important information on which to base the size of the training effort.

It is surprising that the apprenticeship system has persisted in spite of the obvious difficulty of forecasting accurately so far in advance the requirement for such an expensive commodity. The fact that the numbers recruited are rarely sufficient possibly points to the real nature of the difficulty. The manpower planner would aim to do something about overcoming the difficulty, either by improving forecasting or by developing other training methods.

Training and the firm

The training effort should be integrated with other manpower activity within the firm: indeed training efforts should be derived from the manpower plan.

Considerations of cost will naturally be important to a business activity, although insufficient training is not the cheaper alternative, since training is not so much a welfare activity, more a way of maximizing profits and should be subject to the normal criteria of business.

Detailed guidance on the calculation of training intakes has already been given. Whilst the example quoted above was for apprentices, the process is similar for the calculation of re-training effort for existing categories of staff. Whilst that method is apparently impressive, it can do no harm to sound two notes of caution again. One is that the formula is only as good as the figures that go into it—forecasting or planning the future is an inexact art and high levels of accuracy are not possible: continuing revisions and a large measure of suspicion are required. The other is that the calculations should be done for a number of years ahead and then smoothed out in some way to achieve optimum use of costly training facilities.

Other decisions taken as a result of manpower planning activity may have training implications. The training implications of union negotiations are perhaps the most important.[4]

The agreement between Shell Chemicals (UK) Limited and ten trade unions at Carrington made provision for increased flexibility, and a training programme for 1,500 people was drawn up. Engineering craftsmen were trained in the principles of plant operations, and plant operators were trained in maintenance techniques. Training was also provided to explain the changes to supervisory staff, and for senior staff courses were mounted in productivity improvement techniques. The planning of the training programme entailed extensive use of critical path techniques to avoid disruption of normal plant operations.[5] Mobil has also negotiated a productivity deal with training implications at Coryton refinery. A key feature of this deal was the re-deployment of craftsmen's mates. Thirty-four were placed on shift work as process workers, 28 were upgraded after training to craft status, and 14 were re-trained as 'shop helpers'.[6]

However, the training implications of some decisions may be impossible to fulfil. The apprentice intake may need doubling, but apprentice schools are not built in a day. If training cannot be given, this information must be fed back into the planning activity and the next best decision taken.

Outside influences such as government, trade unions and training boards have to be taken into account and decisions with implications outside the firm should not be taken without careful scrutiny of the world outside. A decision simply to double the apprentice intake may be admirable, but it should be taken in the knowledge that twice as many recruits are in fact likely to be available. The manpower planner might then examine entry requirements or alternative sources of supply.

Training and business criteria

Any treatment of manpower as a resource, such as training, should be subject to the criteria applied throughout a business activity. The firm should aim to train for the job as it is actually performed. It would appear that, since the passing of the Industrial Training Act in 1964, a considerable amount of effort has gone into studying jobs and determining the training required. Some of this work has actually been undertaken by training boards, notably the Engineering Industry Training Board, in its identification of 'training modules'[7] which are self-contained units of specialist skills. The skills analysis procedures used are, however, by no means new.[8] A swing away from the 'human relations' approach to supervisory training has begun, towards training based on what the supervisor actually does.[9] A similar new approach has also recently been advocated for the training of training officers.[10] The interest shown in some techniques of training, eg programmed instruction, has given an indirect boost to the objective analysis of training needs.[11]

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[4] *The Fawley Productivity Agreements*, Allan Flanders, Faber, 1964

[5] Training for flexibility, Notes and Comments, *Personnel Management*, IPM, June 1966

[6] *Business*, June 1965

[7] *First Year Training for Engineering Craftsmen and Technicians*, EITB, 1966

[8] See, for example, *Industrial Skills*, W Douglas Seymour, Pitman, 1966

In checking that the aim of training has been achieved, there are rather fewer grounds for hope. Trade-tests for apprentices, or the follow-up of ex-trainees, have not been ideas which have commended themselves. The Engineering Industry Training Board has, however, begun to introduce testing procedures into its first year training course for apprentices. It is to be hoped that this is the spearhead of a new attack.

The Government's role in training

Until very recently the Government has played virtually no part in industrial training at all; it concerned itself with the educational aspect of preparing men for their jobs, leaving their 'training' to industry. This division between education and the more vocational 'training' element has become increasingly blurred, notably as a result of the introduction of sandwich courses in which alternate and linked periods are spent on education and training. A White Paper in 1961 focused attention on the educational content of training for jobs below the level of technologist.

The step into industrial training proper came cautiously, the Government merely offering advice to industry. The report of a committee chaired by Robert Carr[12] led to the establishment of the Industrial Training Council and the Industrial Training Service. The main emphasis of the report was on the need to extend and improve the apprenticeship system, and the Industrial Training Council had considerable success in introducing apprenticeships in the smaller firm by encouraging the formation of group apprenticeship schemes.

However, advice and exhortation were insufficient: shortfalls in the quantity and quality of training persisted at the craft and technician level. Under the 1964 Industrial Training Act an element of compulsion was introduced. The Minister of Labour was empowered to set up Industrial Training Boards comprising industrialists, trade unionists and educationists. Each ITB has certain powers under the Act, but the real power rests in raising a levy and in making payments for approved training activities. The Central Training Council has replaced the Industrial Training Council, and provides advice to the Minister. The Council can be especially useful in considering, through its specialist committees, training matters which cut across industrial barriers. Its publications have made contributions in the fields of supervisory and clerical training, and in the training of training officers.

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[9] *Supervisory Training. A New Approach for Management*, HMSO, 1966
[10] *Selecting and Training the Training Officer*, Nancy Taylor, IPM, 1966
[11] ***Programmed Instruction***, **D Mackenzie Davey and P McDonnell, IPM, 1964**
[12] *Training for Skill*, HMSO, 1958

Industrial Training Boards

When talking about manpower forecasts the concern is primarily with quantity. From the discussion before the 1964 Act was passed it is clear that the main concern was two-fold: the spreading of training costs more fairly and the improvement of the quality of training. There is, in the Act, no overt reference to the quantity required of training. The Official Guide to the Act[13] has, however, been more specific on quantity. It lists the three main objectives of the Act as:

> to ensure an adequate supply of properly trained men and women at all levels in industry;
>
> to secure an improvement in the quality and efficiency of industrial training;
>
> to share the cost of training more evenly between firms.

That the ITBs should have a role in matters of quantity has also been confirmed by the Ministry of Labour. In 1965, Richard Marsh, then Parliamentary Secretary, Ministry of Labour, told the Managing Directors' Conference that ITBs would be much concerned with manpower budgeting to establish training requirements. In April 1965 the Department of Economic Affairs analysed by region and by occupation the shortage of 27,000 skilled workers[14] and laid the problem at the doors of the ITBs.

The Central Training Council has also pronounced on the question of quantity:[15]

> In many ways, one of the most complex tasks facing the training boards will be that of producing realistic manpower budgets as the basis for estimating the training requirements for their industries. Boards will have to arrive at forecasts of future manpower requirements, taking account of such factors as the existing supply (and shortages) of manpower by occupations; the anticipated growth or contraction of the industry; the degree and character of innovation and technological change; wastage rates; demographic and educational changes; and changes in the level and direction of demand for goods and services.

The levy/grant

The most powerful weapon in the armoury of the ITBs is that of the levy/grant. Large sums are involved here. The first round of levies raised £92 million, and the yield will be much higher as more boards levy and as the types of training covered increase. In its recent report to the Minister, the CTC identified the study of the quantitative requirements for manpower as the main task before ITBs and Roy Hattersley, Parliamentary Secretary to the Ministry of Labour, has suggested that grant structure should be fitted to future requirements.[16] It is clear that the means of increasing quantity, as well as

[13] *Industrial Training Act 1964: General Guide—Scope and Objectives*, HMSO, 1964

[14] DEA: Industrial and Regional Progress Report, April 1965

[15] Central Training Council, Memorandum No 5, 1965

[16] Speech to BACIE conference, May 1967

distributing training costs more fairly, lies in the weapon of the levy/grant systems.

Yet present levy/grant systems are neither fair in redistributing the cost nor geared to achieve the correct amount of training. Existing levy/grant systems consist of a levy on all firms of a percentage of payroll, or in the Iron and Steel ITB, a fixed sum for each man on the payroll. From the sum levied, *per capita* grants for each employee undergoing approved training are paid, together with specific grants for certain approved training facilities.

The unfairness of the systems stems from the fact that inevitably different organizations within the same industry have different training needs. The composition of the work-force, the rate of expansion or contraction and the rate of labour turnover—all affect the size of the training effort required. Two attempts are being made to mitigate this unfairness, but only insofar as the composition of the workforce is concerned. The Ceramics, Glass and Mineral Products ITB does this on a broad basis by having different levy rates for different sections of its industry. The Engineering ITB goes further and takes into account different manpower patterns in individual companies by fitting its grant structure to the proportion of trainees in each of four categories of employees: technical/administrative, skilled, semi-skilled and unskilled. Thus the firm with a largely unskilled work-force is not penalized for being without apprentices.

The shortcomings of present systems result from the way in which ITBs determine the total size of their levies. The aim of the Engineering ITB has been to levy a sum equal to the present cost of training and the CTC has endorsed this, saying that other boards, who at present levy less than the present cost in their industries, should move quickly towards this position.[17] The apparent assumption is that the present expenditure on training is sufficient. The same assumption is built into the Engineering ITB's grant policy: the firm with the same proportion of trainees in each category as the national average in engineering gets 100 per cent of its levy back in grant. Yet, with a shortage of skilled manpower persisting in Britain, this assumption is at first sight bound to be wrong.

An effective levy/grant system

It is theoretically impossible to increase the amount of training in an industry by a levy/grant system if the total levy is less than the cost of the training which the ITB decides ought to be undertaken, because it cannot provide incentives. This also means that grants for any particular type of training which the ITB wishes to promote must be equal to the full cost of doing that training in an efficient manner. If these conditions are not fulfilled, it is cheaper for a firm not to do the training than to do it, although not as cheap as it was before the Industrial Training Act. It is true that the present operation of the Act has focused attention on training and thus increased quantity. But at present ITBs are not able to exert a direct influence on quantity nor, indeed, are most of them directing attention to what the future supply should be.

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[17] CTC Report to Minister, HMSO, 1965

In order to ensure that training in their industry is right in quantity, ITBs must be involved in forecasting, on the lines set out by the CTC in Memorandum 5. The forecast for an industry will be much the same as the forecast already outlined for the firm. They must forecast the demand for labour and also the supply both within and outside the industry. Utilization will be of prime importance and, indeed, training could be one means of making improvements. Naturally the forecasts must be in skill categories and some will need to be long-term: six years is the minimum forecast period if the training takes five years and, to smooth out the training effort and use facilities evenly, longer periods are required.

These forecasts will produce a balance sheet of skills for the industry: there will not only be requirements for new entrants but the changing pattern of the industry is almost certain to demand retraining of existing employees—a problem already identified by the CTC as requiring urgent attention but not quantified by such forecasts. Only the Electricity Supply ITB so far has examined future demand and set apprentice intake targets for its industry as a result. But the Iron and Steel ITB is sponsoring a study of future manpower needs and the Engineering ITB is giving some thought to the matter. In addition, the Scottish Committee of the CTC has made some broad forecasts of skilled manpower requirements in Scotland.

Having made such forecasts, the ITB should levy what the training required would cost although, if the quantity of present training is far below what it ought to be, the progress towards this amount of levy could be gradual. However, the levy would need to be a little above the current expenditure on each occasion. The grants for approved training would be equal to the cost of doing it. Thus many industries would be faced with higher levies than at present. The 2½ per cent levy of the Engineering ITB, which is only the present rather than the right expenditure, shows the order of magnitude.

As well as enhancing effectiveness the system would minimize unfairness, in that a company with low requirements could, if it wished, do additional training beyond its needs and recoup the levy which it paid, thus supplying trained manpower for the rest of the industry. If the grant is less than the actual cost of training, as is general now, such a firm is bound to lose.

On the assumption that the present training expenditure is insufficient, an ITB operating such a levy/grant policy is bound to have a small excess of levy over grant: the assumption would be checked by forecasts and a situation of shortage might require better utilization rather than more training of new entrants. But if training is insufficient, the surplus money needs to be put at once to effective use: to spend it on research in the field of training would achieve this. Research into training methods could notably improve quality, but it is suggested that the prime need is for research into the question of future manpower requirements. Apart from the Iron and Steel ITB project, little is being done. Indeed, not a great deal is being done in the area of training methods. The Ministry of Labour offers research grants of half the cost of research but only 19 projects have been sanctioned and only one was sponsored by an ITB—a study of catering skills for the Hotel and Catering ITB. However, some ITBs are, in fact, paying for some research themselves.

Co-ordination of ITBs

The CTC's functions are essentially advisory and there is no formal control over the activities of individual ITBs. The emphasis on quantity and forecasting requirements will make it particularly important that the ITBs should formally work together. Many occupational categories cut across industrial boundaries and movements in and out of an industry have a bearing on forecasts of manpower requirements. Co-ordination is essential and the proposed National Manpower Commission would be the body to provide it. Indeed, the NMC would provide at least the basis for many of the forecasts and the detailed forecasting of the ITBs would be complementary.

Roy Hattersley, in the speech already quoted, said:

> "We need to examine how far the grant structure should be geared, not to the total amount of training that goes on today, but to the total training bill necessary to meet the demands of the 1970s and 1980s. I believe it can and must be done."

And a system such as that outlined here is necessary to do it.

Government and retraining

An organization may be facing internal retraining problems, but recent events have emphasized that it is more likely that men moving out of a firm, or even from one industry to another, may require retraining. Unless this is provided as initial training by the new employer, it is a national problem, since it is affected by the national situation created by changing technology and markets.

There are 32 government run training centres with 6,400 places; a further six centres and some changes in the existing ones will bring this total to 8,600 places by 1968. The annual throughput will, therefore, be about 18,000. These centres are generally accepted as providing a good standard of training, in the time taken, but there remains a good deal of local opposition to the acceptance of men retrained in this way for skilled occupations. Normally, trade unions at national level applaud the retraining effort and recognize the necessity for it; yet many firms know that their own craftsmen, who served their apprenticeships for the prescribed five years, will not accept these men into their ranks.

The main problem is not the acceptance of the retrained men: with determination this could be overcome. The real problem is the puny size of the retraining effort. A striking contrast is with Sweden, which retrains around 55,000 per year, although its working population is only one-sixth of Britain's. The workers made redundant by BMC alone in 1966 could have more than filled every training place then available in government centres in Britain.

The Minister of Labour has announced that the Government is also tackling the problem another way by encouraging industry to do its own retraining. He is making available, for one year only, £2 million of government money to be spent by Industrial Training Boards on adult retraining schemes. The sum needs to be put in perspective. Set it, for example, against the £75 million levied annually by the Engineering ITB, which represents roughly the cost of that industry's possibly inadequate training effort. Or think of it as about £4 for each unemployed man.

The hard fact is that no training board has yet tackled adult re-training as a major issue.

> And so it transpires that, in Britain, despite all the shouting and commotion about her wonderful Industrial Training Act and despite the incredible expense of the new system, when it comes to the crunch, the first occasion on which society turns to the system for some positive and immediate action, the system cannot meet the requirements?[18]

A massive increase in adult re-training facilities is called for over the next ten years to facilitate the changes made by people in going from one occupation to another: without such retraining programmes, it is hard to see how men and women will, willingly, adapt to a changing society. Our present efforts are primitive and unreal.

At this stage, the size of a national retraining programme can only be hinted at. In general terms, we need to think of increasing our retraining efforts to about 250,000 people a year. This would represent one per cent of the labour force. A better estimate can only be made when far more information is available from more sophisticated forecasts than have been attempted so far. Such a massive retraining effort could not be undertaken by the Government Training Centres alone: it needs to be a specific task for the Industrial Training Boards, co-ordinated by the National Manpower Commission.

Retraining programmes and associated redeployment will have to be associated with new forms of wage-related payments for the period of the training. At present, a single man would receive £8 a week, with free travel and other benefits, while attending a 25 week course at a GTC: a married man with four children could get a maximum of £11 a week. These are simply not realistic when taking family responsibilities into account. New responsibilities of employers for redeployed workers will be needed to cover the period from the declaration of redundancy until fully effective in other employment. This will put the onus for social security payments on the employer, rather than yet another burden on the state. In turn, it will considerably increase the concern of management to make the best use of human resources.

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[18] J Wellens, *Industrial Training International,* December 1966

Chapter 9—Manpower and education

A major factor in the examination of the external supply of manpower which will be available to an organization in the future is the output of the educational system. Conversely, one might expect that, in making decisions about the provision of education, the Government would need a clear picture of future requirements of manpower trained to various levels and in various skills and disciplines. Looked at from either viewpoint, this requires long term planning. Since education courses span a number of years, the future availability of certain skills is already determined three to five years ahead. The output of medical schools in 1972 is already fixed, so that if it were suddenly decided that, to counteract the brain-drain, more doctors were needed, no significant increase in numbers of qualified doctors could conceivably occur before 1973–74. Until changes are made in the length of apprenticeship training, which is now widely agreed to be unreasonably long, the output of young skilled craftsmen is also determined up to 1972.

The importance of education as a significant contribution to the nation's wealth through an investment in people is a fairly recent concept. It has been viewed in this way when assessments are being made on educational priorities in developing countries. In these countries, costly educational investment at different levels has to be more rigorously assessed in terms of community benefits. The general view in Britain has been that education is good in itself and any link with subsequent employment was to some extent fortuitous. It was felt inappropriate to attempt to equate disciplines to likely needs, although this could easily entail a shortfall in some essential subjects, together with a lack of suitable employment for some who had chosen other subjects. This attitude was perpetuated by the Robbins Committee.[1] In affirming that a considerable expansion of the number of places in higher education would be necessary to accommodate the growing numbers in the sixth-form, they decided that the planning involved was too difficult. The criterion for the provision of various courses within the total recommended should effectively be individual choice. Yet, in the absence of a full-scale counselling service, individual choice remains uninformed and a poor basis for decision. The numbers who are quite clear in their own minds about the course which they want to follow and who rightly should be allowed to do so are probably quite small.

Other countries, for example Sweden, whose national manpower forecasting was discussed in Chapter 7, regard the need to decide about educational provision as the prime reason for planning. Nevertheless, there are problems in providing the right education for national needs. It is widely known that the standard of entry to engineering studies is below that of pure science; that while potential

[1] *Higher Education*, Cmnd 2154, HMSO, October 1963

students in arts subjects fail to achieve entry to higher education, places in engineering and technology are more readily available. It is also known that many science graduates are opting for university rather than industrial appointments, and that the less well-qualified arts graduates are finding increasing difficulty in getting jobs. What should be done?

A radical examination of the problem of planning education was begun when the Unit for Economic and Statistical Studies on Higher Education was set up at the London School of Economics in 1964 under Professor C A Moser. The aims of this Unit were described in the following terms:

> The Unit plans to do research on various economic and statistical aspects of higher education. Some of the projects will relate to methods of educational planning at a national level; some to the relationship between what is provided in higher education and what is needed in industry and the labour force generally; some to the financing of higher education . . .

The first research studies were intended to be devoted "to the relationship between educational background and occupational structure in British industry (especially in its higher echelons), and with the relationship between these and techniques of production and performance".

This was a project of immense, and at first probably unrealized, difficulty. Most of the time in the early stages was spent on a pilot study on the electrical engineering industry.

Since 1966, the Unit has concentrated effort on analysing the relationships between the use of qualified manpower and economic performance in 100 establishments in the electrical engineering industry. It sets out to integrate the study of manpower more closely with the facts of the industrial operation. The project hopes to explain the differences of manpower characteristics in terms of differences in the economic and industrial factors. From this analysis, it is intended to discover the extent of any association between economic situations within firms and their manpower patterns. The economic performance information sought from the companies is gross turnover, net output and capital resources. Personnel information required for monthly-paid staff relates to age, service, earnings, education, job and training. This information is being asked of the companies from 1956 to 1965.

The results of this study will not be available for some time, when many more commitments will have been made in education.

The basic flaws in investigations of this sort are that they take far too long to produce any answers and provide information on too narrow a front. This is particularly critical at a time when there is an unusually high rate of expansion in higher education.

A report[2] on the use made of educated manpower written by Mark Blaug, Maurice Peston and Adrian Ziderman commented: "It seems absurd to invest annually hundreds of millions of pounds in human capital without asking whether, from an economic standpoint this money could not be allocated more efficiently".

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[2] *The Utilization of Educated Manpower in Industry*, Oliver and Boyd, 1967. Also Efficiency and the Labour Force, *New Education*, August 1966

They concluded tentatively "... that education in the UK does have a positive rate of return not excessively out of line with returns to capital in the rest of the economy".
"... and that the return seems higher at technician level rather than at the degree level itself".

Output to 1970

Statistics published by the University Grants Committee show that a significant proportion of students in all faculties stay at university to work for a further degree or to do research.[3] The opportunities to remain at university after obtaining a first degree have been increasing on the science and engineering sides, too (Figure 12).

Figure 12

The employment choices of graduates

The choices of first-degree graduates in engineering, technology and science.

	1960	1961	1962	1963	1964	1965
Higher education and research	24.4	24.5	25.0	27.3	28.4	29.7
Schools, colleges, teacher training	16.7	15.6	17.8	18.0	17.1	14.1
Industry	39.5	39.8	35.5	33.3	34.2	36.0
Government	5.2	5.3	5.3	5.9	3.6	4.7
Other	14.1	14.7	16.6	15.4	15.7	15.3

Source: Will Industry's Supply of Scientists Soon Run Dry? Willem van der Eyken, *Financial Times*, 14 June 1967

The universities, through being able to offer government sponsored research grants and studentships to such a high proportion of graduates, retain large numbers after they have qualified. It is doubtful whether this can be regarded as being automatically in the best interests of the country. The Swann Report[4] contained a strong suggestion that much of the present postgraduate work done at universities is misdirected. Too many research students are misused as technicians or supervisors of undergraduate work.

The basis for selection of research students requires investigation. The normal criterion used is class of degree, although no one has established that the ability to do creative research correlates highly with ability to gain a good class degree. Universities maintain that they are pressurized into providing postgraduate research degrees by the larger employers who seek out MSc and PhD scientists. In the light of Denis Pym's researches perhaps it is the employers, whether industry or government, who ought to act first. It is to be hoped that the stereotyped attitudes revealed in a *Guardian* editorial[5] can reasonably soon be dispelled: "Research in pure science will rightly continue to attract a proportion of the best graduates. But others, with less capacity for the highest forms of original research, should be encouraged to take up work of practical value to industry".

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[3] *First Employment of University Graduates*, UGC Report, 1964–65, HMSO, 1966
[4] Interim Report of the Working Group on Manpower, *Parameters for Scientific Growth*, Cmnd 3102, HMSO, October 1966
[5] 12 October 1966

Reports from the University Central Council for Admissions (UCCA) show that companies which will be looking for engineers and scientists in the 1970 period are going to find it as hard to recruit good people as it is today. Engineering places are empty; arts places are over-subscribed. This is a tragedy; the growing demand is for those who are demonstrably not going to be available. Furthermore, if the 1969 output of graduates follows the pattern of 1966, the outlook for industry is depressing. Many people are being attracted into universities and the public services by the high level of security and the competitive salaries. Business is low in esteem at present. An Oxford graduate summed up his views in the words:[6]

> It is not considered at all glamorous or exciting to be part of the process of producing, say, electric lamps, however necessary they may be. Advertising, journalism, television, publishing—all have something of the 'creative' and 'smart' about them, attractions that not even Shell or ICI can rival. A graduate has more status among his friends as a £12-a-week BBC floor assistant than as a £1,200-a-year Shell trainee.

He went on to sum up the view of industry amongst the educated young—

> To graduates, industry seems composed of men who are hard, self-seeking and dull.

The implications for those concerned with matching forecast demand with recruitment of young people are obvious.

There is a need, too, for change to the universities. The Bosworth Report on the education and training of engineers has made a most revealing comment on the general isolationism of many university departments today:

> Without exception, university graduates spoke of almost complete ignorance, during their undergraduate time, of the nature and variety of industrial employment open to them.[7]

Breaking down the barriers

This chapter has dealt with one aspect of higher education, the universities, not because they are regarded as the only source of manpower for industry but because they appear to offer the greatest educational problems facing the country.

The polytechnics and the colleges of technology are playing the more important part in supplying the country's technicians, craftsmen, technologists, and business-orientated recruits to industry. A growing miscellany of refresher and part-time courses is being offered, particularly in business and management studies. There is justification for doubting whether or not this multiplicity of courses, being so widely offered, is not spreading the teaching resources too thinly. The salaries offered to heads of departments, around £2,800, are hardly conducive to tempting into the technical colleges experienced business practitioners, who have the ability to teach as well. These reservations apart, this side of the education service is making a significant contribution to industrial and commercial needs.

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[6] *Times Review of Industry and Technology*, October 1965

[7] *Education and Training Requirements for the Electrical and Mechanical Manufacturing Industry*, HMSO, July 1966

Matching education to the nation's needs is by no means easy and three problem areas can be identified: the environmental influences, the content of the courses and the occupational counselling services. Each merits separate evaluation.

Environmental influences

Schools and universities are generally staffed by men and women who have not ventured outside the academic cloisters. Their career progression is generally either school—university—school, or school—university—university. Even in the fields of science and engineering, science teachers may only have done research in universities or government research establishments and there are few engineers teaching in schools. Universities are generally staffed by those who have eschewed the world of business and commerce, and many apparently regard it as a lower order of activity than teaching and research in academic atmosphere. Such attitudes, if general, have their effect on the young.

Schools tend to be insulated from industry in any country but universities—even science and engineering departments—appear to be more isolated and isolationist in Britain than are comparable institutions in other countries. There is greater interchange in France of staff between the public services and industry: in Germany it is more common for university staff to hold consultancy or part-time posts in industry.

It has been said from time to time that it is to be hoped that men and women with industrial or commercial experience will take up appointments in schools. This is a pious hope, if for no other reason than that salary levels are not comparable. One possible movement is into headmaster or headmistress appointments from industry. Headships are being more realistically assessed as truly management appointments for which 15 years teaching children in a classroom is perhaps not a good enough criterion of probable success. However, this too is unlikely to be widespread

It is desirable that the governing bodies of secondary schools should have more vocal and informed businessmen on them. The composition of such bodies is heavily weighted by local political considerations. Eminently worthy though their members may be, they do not generally bring to these meetings a practical concern for bridging the gap between the schools and business. If governments are sincere in their concern about lack of contact between education and industry, they should demonstrate this by reducing drastically the number of political appointments to school and college boards of governors.

At the university level more varied steps can be taken. The universities appoint examining boards for school examinations: few panels have active businessmen on them, even for such subjects as the sciences, engineering studies, mathematics and economics. The academic boards of studies which control university examinations could do with an infusion of industrialists taking an active role in the discussions of university curricula and examinations.

More secondments from industry to universities should be encouraged. Precedents already exist for short-term secondments to the National Economic Development Council and the Department of Economic Affairs. Some scientists, engineers, mathematicians and economists can surely be spared from some of the larger companies, at maintained levels of income if necessary, to teach in universities. This would call for a new outlook from industry itself but the return on the investment, taking the longer view, could be considerable.

There is need for a greater willingness from the universities themselves. Professors and lecturers are normally very willing for their students to spend the summer vacations in industry, but many regard the suggestion that they themselves might like to do this as unfeasible. Yet this is where the greatest benefits would lie. Many companies would be willing to act as host to a lecturer in engineering to work for three months to a year on the company's problems but many university departments appear loathe to establish such contact.

The curriculum

The 15 year old has to make career orienting choices between subjects in order to prepare for public examinations. Lord Bowden has frequently proclaimed against the specialization prevalent in schools which ultimately narrow the field of occupations open to the school and university leaver. The causes of this are pressures on university entrance which demand concentration on a narrow band of subjects if success is to be possible; this is felt throughout the educational system.

School science teaching is in serious straits. An investigation on science teaching in Wales, reported in the *Guardian,*[8] revealed that the qualifications of physics staff in grammar and comprehensive schools included those with honours degrees in geology, history and education. The Report, compiled by the Central Advisory Council for Education (Wales), expressed concern not only at the shortage of staff but also at the "progressive decline in the academic quality" of the younger, qualified teachers of science and mathematics. About 80 per cent of the secondary modern schools had no teachers of mathematics and 87 per cent no teachers in physics who were specially qualified for the work.

Although no real drift from science to the arts in sixth-forms was detected by Professor F S Dainton's Report,[9] it is hardly to be expected that, with the present staff shortages in science and mathematics, there will be anything but a decline in the proportion of sixth-formers taking these subjects. Industrial demand for mathematicians and technologists is likely to increase considerably, but it is difficult to know how this demand is likely to be met, considering the empty places at universities and the declining quality of schoool science and mathematics teachers.

[8] 19 October 1965

[9] Council for Scientific Policy Report, Cmnd 2893, 1966

Too pure by half

When the school-leaving age is raised to 16, the additional year will offer a great new opportunity for introducing work experience into schools. Most of the discussion has centred on the problem of finding accommodation for those extra 350,000 children and for recruiting the 20,000 or so extra teachers. More time should be spent on assessing the possibilities of providing planned bridging courses between school and work. In 1962, Sweden decided that all 15 year old schoolchildren should have the opportunity to gain work experience, as well as to obtain better vocational counselling.[10] It is too early to assess the benefits of PRYO (praktisk yrkes orientering) but it suggests what we in this country should be thinking about.

Many adverse criticisms are now being made about the academic bias of certain university courses. The Bosworth Committee commented pertinently on the university courses of engineers. It showed a significant gap between the knowledge imparted by the degree course and the requirements of an employer. The gap is characterized by a different approach to problem-solving; and a different social environment with obligations, such as working in a team as part of a hierarchical organization.

The Report suggests that these are considerable changes for a graduate to make within a short space of time, and postgraduate industrial training must ensure that they are made in such a way that the graduate's enthusiasm, love of intellectual challenge and urge for responsibility are met. Anything as crude as traditional 'sitting next to Nellie' or 'sink-or-swim' training is liable to result in disillusionment and boredom. These, in turn, could lead to wastage, and, in the long run, to poor recruitment owing to the bad reputation of industry as a career.

The Report suggests that these problems could be overcome by providing jointly-run university-industry courses for graduates after they had completed their first degrees. There is probably widespread agreement on the diagnosis but the cure preferred raises many problems. It does represent a constructive attempt to overcome the present problems. Industry is undoubtedly going to have to become more actively involved in overcoming them if it is to benefit in the long run.

Michael Clapham, a director of ICI, advocates as a solution degree courses specially designed to produce the graduates so badly needed by industry.[11] He is not proposing vocational courses as such but general courses which are accompanied by guidance on graduate careers and the further courses of study that will be needed. Writing in the *New Scientist*,[12] Dr R A Coombes urges a fundamental reassessment of the way in which we teach the sciences and engineering to improve their integration and give a better understanding of the inter-relationships of the subject matter.

[10] *Times Educational Supplement*, 9 September 1966
[11] Birmingham University Magazine, *Alta* (1), 1966
[12] 21 July 1966

Occupational counselling

Schools are notoriously reluctant to spend time giving careers advice. They do not believe it is their prime responsibility: they are also normally badly equipped to do it. Professor Alec Rodger has written of the dismal state of careers guidance in schools from discussion with careers teachers.[13] The Youth Employment Service is officially supposed to be on hand to offer advice and guidance to school leavers. Yet there are only sufficient Youth Employment Officers to give the most perfunctory guidance to 15 year olds—perhaps only one 15 to 30 minute interview and, on many occasions, this advice is given too late. Sufficient advice of the most informed kind is rarely available to boys and girls before they chose their first job, and they are able to get little advice later on.

Those who go on to higher education in universities come into contact with university appointments boards. However, the Heyworth Committee criticized their lack of resources.[14] Their role *vis à vis* employers, university departments and students needs to be more clearly defined.

Planning for versatility

From what has been written here, it is clear that there can be no 'right' type of educational course to follow for a particular job and no one, today at least, can presume to spell out the precise output of faculties of arts, economics or engineering. But it is essential that there should be a mechanism to provide the teaching resources that can be used in educating and training adults along new lines. In general, it might be advisable to consider education being provided in several stages: why should it end at 21?

The Ashby Committee (1967) on the future of Birkbeck College, which provides part-time evening courses leading to degrees and diplomas, emphasized the justification for Birkbeck's existence. Over a period of time, there should be an extension of education of this type. This would give older students the opportunity to adapt their skills to changing situations, whether from personal choice or pressure of circumstances. It is urged that the London and Manchester Business Schools give immediate attention to providing postgraduate diplomas and MSc courses in business studies, for part-time and evening students. This would certainly meet a national need and provide the opportunities for those who are unable to be released by their firms or who consider it undesirable to interrupt their careers to attend as full-time students.

There will be a need to devote more resources to further education courses in topics of occupational relevance. These should be priced on an economic basis, so that the best staff can be brought in to teach on them.

The 'University of the Air' is being revived. But it is doubtful if any of the first courses should be in pre-history or modern art. It is undoubtedly cheaper to provide courses "leading to a general degree, mainly in liberal arts subjects" as outlined by Brian Jackson.[15] However, in Poland, the first course planned for television lectures combined with evening courses and correspondence courses will be devoted to the first two years of engineering studies.[16] The director of Poland's educational television service was reported as saying that technical studies were chosen for the pilot project for several reasons, not only because these "were the easiest to organize", but also because Poland "has a great need for engineers in all fields—construction engineering, mechanics, electronics, mining, metallurgy and so on".

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[13] *CRAC Journal*, Summer 1964

[14] *University Appointments Boards*, A report by Lord Heyworth, 1964

So, too has Britain. It is courses at many levels, in science, engineering, mathematics, business studies and marketing that should be given greatest priority by the Open University.

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[15] *Times Educational Supplement*, 25 November 1966

[16] *Times Educational Supplement*, 9 September 1966

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